Differential courses of delay discounting in mild cognitive impairment and Alzheimer´s disease

People prefer to receive a reward rather sooner than later, which means that people put a smaller value on a reward they have to wait for (= delay discounting, DD). But when people get to choose between an immediate but smaller reward and a delayed but larger reward, people seem to habitually differ in their choice behavior. While some are generally more willing to wait for a larger future reward, others are more impulsive and cannot resist the tempting immediate (but smaller) incentive. The individual ability to wait for (larger) future gains has been found to be related to all sorts of positive life aspects, such as to higher academic performance, mental health and social functioning. In science, the DD measure has become a useful paradigm to investigate research questions linked to impulsivity, self-control and self-regulation.

Age appears to be a crucial factor influencing the habitual choice behavior, as one can easily imagine that children are generally more impulsive (= higher DD) than adults (= lower DD). But how does this look for older adults? In view of the limited lifetime of elderly people, it may not necessarily be very adaptive to wait for a future reward, even if it is lager. But we do not know a lot about how DD develops in older adults, especially in those with (progressive) cognitive decline. As of that, in the current study, we were interested in whether older adults with different degrees of cognitive decline would show different trajectories of DD when observed over a period of time.

We examined *N* = 111 female and male participants with a mean age of 75 years. In our sample, we included *n* = 64 individuals with mild cognitive impairment (MCI), which can be a precursor of dementia, and *n* = 47 individuals diagnosed with mild Alzheimer's disease (AD), a yet incurable form of progressive pathological cognitive decline. Within the time frame of two years, we assessed data from our participants on three measurement occasions. At each measuring point, we assessed current psychiatric diagnosis, functional abilities and cognitive functioning (including intelligence). To assess DD, we repeatedly applied a DD test. The DD test included 27 questions such as the following: "Would you prefer 45 CHF (Swiss Francs) today or 95 CHF in 33 days". The reward size as well as the delay varied between 32 - 107 CHF and 7 – 146 days, respectively. As a general note, healthy individuals discount smaller rewards more than lager rewards (= DD magnitude effect). Depending on the answer pattern it is possible to calculate a global DD rate for each participant.

As expected, we found that intelligence was meaningfully related to DD: the higher the intelligence the lower the tendency to discount future rewards (in both groups). Further, we found that the courses of DD were meaningfully different for MCI participants and AD patients. While the trajectories of DD remained relatively stable in the group of the MCI participants, DD trajectories of the AD patients pointed toward an increase in DD. This signifies that AD patients became more impulsive in their choice behavior over the observation period of two years. We additionally found that while AD patients showed a typical magnitude effect at baseline (which is also shown by the

MCI participants), AD patients did not make a difference anymore between smaller and larger reward amounts after the first measurement.

Since self-control is a capacity that can be trained, future prevention and early intervention programs should not only include training memory, physical capacities, and functional abilities, but also self-control capacities such as DD.

Myriam V. Thoma [1,2]***, Andreas Maercker*** [1,2] ***and Simon Forstmeier*** [1,2,3]
[1]*University of Zurich, Psychopathology and Clinical Intervention, Zurich, Switzerland*
[2]*University Research Priority Program "Dynamics of Healthy Aging", University of Zurich, Switzerland*
[3]*University of Siegen, Faculty II, Developmental Psychology, Siegen, Germany*

Publication

Evidence for Different Trajectories of Delay Discounting in Older Adults With Mild Cognitive Impairment and Mild Alzheimer's Disease.
Thoma MV, Maercker A, Forstmeier S.
J Gerontol B Psychol Sci Soc Sci. 2016 Feb 19