

Bio-behavioral inquiries regarding cognitive aging and distance to death

The role of gender, APOE, grip strength and subjective memory

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Avhandling för avläggande av filosofie doktorsexamen i psykologi som med vederbörligt tillstånd av samhällsvetenskapliga fakulteten vid Göteborgs Universitet kommer att offentliggöras försvaras fredagen den 8 april 2016, kl 10:00 i sal F1, Psykologiska institutionen, Haraldsgatan 1, Göteborg

Fakultetsopponent: Professor Dennis Gerstorff
Professor i utvecklingspsykologi vid Humboldt-Universitetet i Berlin

This thesis consists of a summary and the following four papers, which are referred to by their roman numerals:

- I. Praetorius, M., Thorvaldsson, V., Johansson, B. & Hassing, L.B. (2014). Gender differences in cognitive performance in old age: Adjusting for longevity. *GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*, 27(3), 129-134.
- II. Praetorius, M., Thorvaldsson, V., Hassing, L.B. & Johansson, B. (2013). Substantial effects of apolipoprotein E ϵ 4 on memory decline in very old age: longitudinal findings from a population-based sample. *Neurobiology of Aging*, 34(12), 2734-2739.
- III. Praetorius Björk, M., Johansson, B. & Hassing, L.B. (2016). I forgot when I lost my grip - strong associations between cognition and grip strength in level of performance and change across time in relation to impending death. *Neurobiology of Aging*, 38, 68-72.
- IV. Praetorius Björk, M., Johansson, B & Hassing, L.B. (Submitted). Terminal decline in subjective memory in the oldest old and its links with objective memory - A longitudinal investigation in the oldest old.



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Abstract

Praetorius Björk, M. (2016). *Bio-behavioral inquiries regarding cognitive aging and distance to death: The role of gender, APOE, grip strength and subjective memory*. Department of Psychology, University of Gothenburg, Sweden

To better understand the nature of cognitive functioning later in life, it is important to gain further knowledge regarding factors that contribute to cognitive aging. Therefore, the overall aim of this thesis was to investigate cognitive change in relation to a select set of bio-behavioral markers (i.e. gender, APOE, grip strength and subjective memory) while taking time to death into account. The studies are all based on the OCTO-Twin study, a Swedish longitudinal population-based study on people aged 80 years and older, assessed every other year, at a maximum of five times.

The aim of **study I** was to examine gender differences in levels and rates of change in cognitive performance in the oldest old in the context of time to death. The study did not show any cognitive differences between men and women, with the exception that men showed a steeper rate of decline in semantic memory. This effect was driven by those who had developed dementia and therefore declined at a faster rate than women.

The aim of **study II** was to explicate the assumed negative association between the apolipoprotein E (APOE) $\epsilon 4$ and levels and rates of cognitive change later in life. We found that there was a negative effect of the APOE $\epsilon 4$ allele prior to death also late in life, especially when it came to episodic memory performance. Notably, the influence of APOE on levels and rates of change was highly influenced by incident dementia.

The aim of **Study III** was to examine potential associations regarding levels and change between cognitive performance and grip strength later in life. The results indicated consistent developmental associations across all cognitive domains in levels and rates of cognitive change and grip strength.

In **study IV**, we investigated level and rate of change in subjective memory in relation to impending death, in addition to its associations with objective memory measurements. The results showed a subjective decline in memory in relation to impending death and that the level and within-person change in subjective memory and objective memory are related. In sum, this thesis shows that gender, APOE, grip strength and subjective memory are related to cognitive decline in relation to impending death.

Keywords: *Cognitive functioning, Oldest old, Time to death, Gender, APOE, Grip strength, Subjective memory*

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