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Authors

Potthoff, Ruben

Schagen, Sanne

Agelink van Rentergem, Joost

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Process Modelling for Digit Span Tasks: Attention, Working Memory, and Executive Functioning in Cancer Survivors

Ruben Potthoff

Netherlands Cancer Institute, Amsterdam, Netherlands

Sanne Schagen

Netherlands Cancer Institute, Amsterdam, Netherlands

Joost Agelink van Rentergem

Netherlands Cancer Institute, Amsterdam, Netherlands

Abstract

A considerable number of non-central nervous system (non-CNS) cancer survivors face long-term cognitive impairments after successful treatment, which affects various domains of cognition. Two tests used to measure working memory and attention are the digit span forward and digit span backwards, which were computerized to assess cognitive deficits in cancer survivors. We aim to investigate which cognitive processes are impaired in cancer survivors, by separating the various processes measured in the digit span tests. To this end, we formulate a hierarchical Bayesian cognitive process model which uses raw input data from the digit span and identifies metrics of working memory capacity, attentional control, and executive control. We compare these outcomes between non-CNS cancer survivors and healthy controls, to better localize which processes are affected by cancer and its treatment. Formal modeling allows for the extraction of more precise information in describing the cognitive deficits faced by patients.