

Publication

Investigation of a Model-Based Working Memory Training With and Without Distractor Inhibition and Its Comparative Efficacy: A Randomized Controlled Trial on Healthy Old Adults

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Author(s) Zuber, Priska; Geiter, Emanuel; de Quervain, Dominique J.-F.; Magon, Stefano**Author(s) at UniBasel** [Zuber, Priska](#) ; [de Quervain, Dominique](#) ;**Year** 2021**Title** Investigation of a Model-Based Working Memory Training With and Without Distractor Inhibition and Its Comparative Efficacy: A Randomized Controlled Trial on Healthy Old Adults**Journal** Frontiers in Aging Neuroscience**Volume** 13**Pages / Article-Number** 682474**Keywords** aging; cognition; cognitive training; distractor inhibition; filtering efficiency; practice effects; training; working memory

Background; : Various working memory (WM) trainings have been tested, but differences in experimental designs, the lack of theoretical background, and the need of identifying task-related processes such as filtering efficiency limit conclusions about their comparative efficacy.; **Objectives;** : In this study, we compared the efficacy of a model-based WM training with (MB; +;) and without (MB) distractor inhibition on improving WM capacity to a dual; n-back; and active control condition.; **Methods;** : This randomized clinical trial included 123 healthy elderly adults (78 women, 45 men; aged 64.1 \pm 8.3 years). All groups underwent 12 40-min training sessions over 3 weeks and four cognitive testing sessions. The first two sessions served as double baseline to account for practice effects. Primary outcome was WM capacity post-training measured by complex span tasks. Near and far transfer was assessed by simple span, n-back, visuospatial and verbal learning, processing speed, and reasoning tasks.; **Results;** : Due to preliminary termination (COVID-19), 93 subjects completed the post-training and 60 subjects the follow-up session. On a whole group level, practice effects occurred from prebaseline to baseline in WM capacity (; b; = 4.85;; t; (103); = 4.01;; p; < 0.001;; r; = 0.37). Linear mixed-effects models revealed a difference in WM capacity post-training between MB; +; and MB (; b; = -9.62;; t; (82); = -2.52;; p; = 0.014;; r; = 0.27) and a trend difference between MB; +; and dual; n-back; (; b; = -7.59;; t; (82); = -1.87;; p; = 0.065;; r; = 0.20) and control training (; b; = -7.08;; t; (82); = -1.86;; p; = 0.067;; r; = 0.20). Univariate analyses showed an increase between pre- and post-training for WM capacity within MB; +; (; t; (22); = -3.34;; p; < 0.05) only. There was no difference between groups pre- and post-training regarding near and far transfer. Univariate analyses showed improved visuospatial learning within MB; +; (; t; (21); = -3.8;; p; < 0.05), improved processing speed (; t; (23); = 2.19;; p; < 0.05) and; n; -back performance (; t; (23); = 2.12;; p; < 0.05) in MB, and improved; n; -back performance (; t; (25); = 3.83;; p; < 0.001) in the dual; n; -back training.; **Interpretation;** : A model-based WM training including filtering efficacy may be a promising approach to increase WM capacity and needs further investigation in randomized controlled studies.

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