Kognitivno-motorička (dual-tasking) rehabilitacija i prevencija u kliničkim istraživanjima:

- prevencija pada
- blagi kognitivni poremećaj/Alzheimerova bolest i kognitivna rezerva
- moždani udar
- ortopedska rehabilitacija
- ADHD
- Cerebralna paraliza
- Parkinsonova bolest
- Multipla skleroza
- sport: testiranje, prevencija, rehabilitacija ACL (prednji križni ligament)

PREVENCIJA PADA

👉 **Step training improves reaction time, gait and balance and reduces falls in older people**: a systematic review and meta-analysis. Okubo et al.; 2015
https://bjsm.bmj.com/content/51/7/586

Results: Meta-analyses of seven RCTs (n=660) showed that the stepping interventions significantly reduced the rate of falls (rate ratio=0.48, 95% CI 0.36 to 0.65, p<0.0001, I^2=0%) and the proportion of fallers (risk ratio=0.51, 95% CI 0.38 to 0.68, p<0.0001, I^2=0%). Subgroup analyses stratified by reactive and volitional stepping interventions revealed a similar efficacy for rate of falls and proportion of fallers. A meta-analysis of two RCTs (n=62) showed that stepping interventions significantly reduced laboratory-induced falls, and meta-analysis findings of up to five RCTs and CCTs (n=36–416) revealed that stepping interventions significantly improved simple and choice stepping reaction time, single leg stance, timed up and go performance (p<0.05), but not measures of strength.

Conclusions: The findings indicate that both reactive and volitional stepping interventions reduce falls among older adults by approximately 50%. This clinically significant reduction may be due to improvements in reaction time, gait, balance and balance recovery but not in strength. Further high-quality studies aimed at maximising the effectiveness and feasibility of stepping interventions are required.

👉 **Exergame and Balance Training Modulate Prefrontal Brain Activity during Walking and Enhance Executive Function in Older Adults**. Eggenberger et al.; 2016
https://www.frontiersin.org/articles/10.3389/fnagi.2016.00066/full

Conclusions: The present study demonstrated three mechanisms of exercise training induced functional brain plasticity during treadmill walking in elderly participants who underwent 8 weeks of interactive cognitive-motor video game dancing or conventional balance training. These mechanisms comprise (1) a bilateral reduction in prefrontal brain activity at preferred and fast locomotion speed (with larger effects in the video game dance group), (2) an increase in hemispheric PFC activity asymmetry, and (3) an increased differentiation in PFC activity related to walking speed. The adaptations resemble more trained or young adult-like brain functions as observed in previous cognitive training interventions and cross-sectional fMRI and fNIRS studies on brain activity in cognitive and walking tasks, respectively. The prefrontal adaptations were correlated with improved performance in executive functions and processing speed. These novel findings imply that exercise training is able to reduce the need of prefrontal resources of executive function and attention involved in challenging treadmill walking. We speculate that the elderly might benefit from these additional cognitive resources to focus their attention on other processes while walking. This would be of practical importance in attention demanding real-life situations such as crossing streets or walking while talking and could potentially reduce the risk of falling. Future investigations are warranted that should focus on additional brain areas involved in locomotion and that should include other types of exercise training and challenging walking conditions in order to substantiate or refute the presented findings.

BLAGI KOGNITIVNI POREMEĆAJ (MCI) i KOGNITIVNO ZDRAVLJE

👉 **The efficacy of exergaming in people with major neurocognitive disorder residing in long-term care facilities: a pilot randomized controlled trial**. Swinnen et al.; 2021
https://alzres.biomedcentral.com/articles/10.1186/s13195-021-00806-7

Results

Forty-five of 55 randomized inpatients with mild to moderate MNCD (Mini-Mental State Examination score = 17.2 ± 4.5; aged 70–91; 35 women) completed the study. The exergame group ($n = 23$) demonstrated improvements in gait speed ($p < 0.001$, $\eta^2_p = 0.41$), total SPPB ($p < 0.001$, $\eta^2_p = 0.64$), SRTT ($p<0.001$, $\eta^2_p = 0.51$), MoCA ($p<0.001$, $\eta^2_p = 0.38$), and reductions in CSDD ($p<0.001$, $\eta^2_p = 0.43$) compared to the control group ($n = 22$). There were no differences in NPI ($p = 0.165$, $\eta^2_p = 0.05$), DQoL ($p = 0.012$, $\eta^2_p = 0.16$), and ADL ($p = 0.008$, $\eta^2_p = 0.16$) post-intervention scores between the experimental and control group, albeit DQol and ADL measures showed large effect sizes in the exergame group. The mean attendance rate was 82.9% in the exergame group and 73.7% in the music control group. There were no study-related adverse events reported by the participants, nor observed by the research team.

Conclusions: The findings of this pilot RCT suggest that an individually adapted exergame training improves lower extremity functioning, cognitive functioning and step reaction time and symptoms of depression in inpatients with MNCD residing in long-term care facilities.

👉 **A Systematic Review on the Cognitive Benefits and Neurophysiological Correlates of Exergaming in Healthy Older Adults**. Stojan et al.; 2019
https://dividat.com/assets/main/papers/2019-stojan.pdf

Positive effects on neurophysiological outcomes were present in all respective studies.
In summary, exergaming seems to be equally or slightly more effective than other physical interventions on cognitive functions in healthy older adults. Tailored interventions using well-considered exergames and intervention designs, however, may result in more distinct effects on cognitive functions.

👉 **The Transfer Effects of Cognitive Training on Working Memory Among Chinese Older Adults With Mild Cognitive Impairment**: A Randomized Controlled Trial. Weng et al.; 2019
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6702334/

Results: Compared to the MLA control, the cognitive training group showed significant effects in both the trained (working memory) and untrained (execution function and ability of daily living) domains. The effects of cognitive training on overall cognitive function, working memory and daily life ability of daily living of MCI could be maintained for at least 3 months, even without the cognitive training. Besides, complete mediating effects of cognitive training were found in executive function through working memory and working memory in ability of daily living though executive function, which suggests the presence of transfer effect of cognitive training.

Conclusions: The present study supported that cognitive training could effectively improve working memory in elders with MCI. The training effects on working memory could transfer to other untrained areas (such as executive function), which also improved the comprehensive ability (ability of daily living). And the effects of training could largely persist for 3 months.

👉 **Effectiveness of exercise for improving cognition, memory and executive function**: a systematic umbrella review and meta-meta-analysis. Singh et al.; 2024
https://pubmed.ncbi.nlm.nih.gov/40049759/

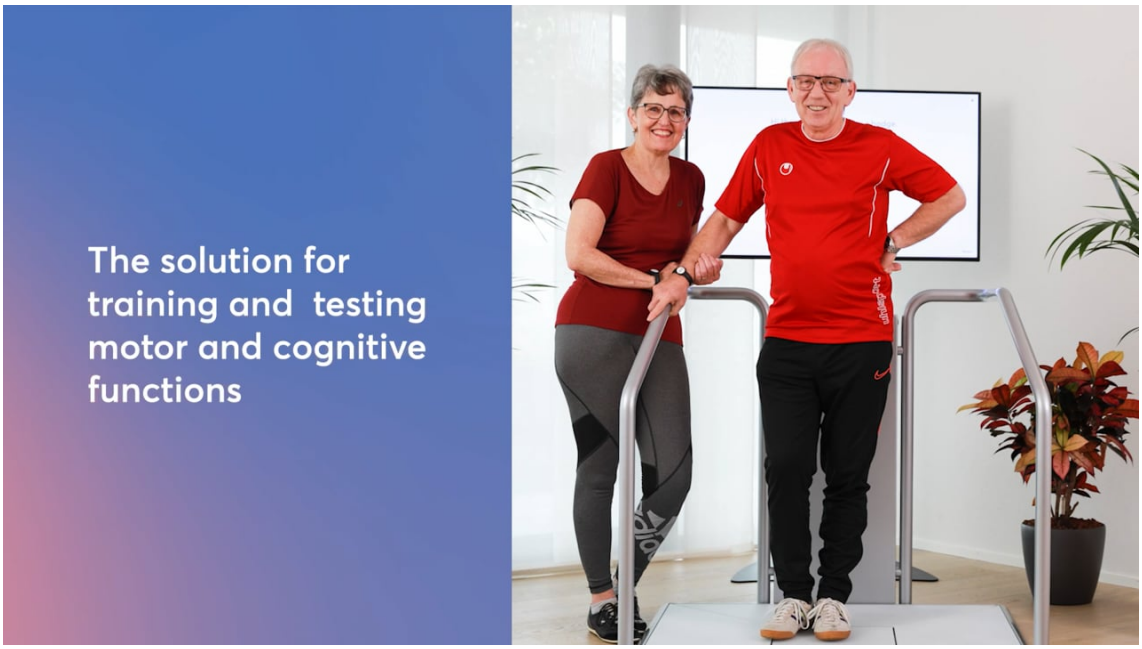
Results: 133 systematic reviews (2,724 RCTs and 258 279 participants) were included. Exercise significantly improved general cognition (SMD=0.42), memory (SMD=0.26) and executive function (SMD=0.24). Memory and executive function improvements from exercise were greater for children and adolescents than for adults and older adults. Those with attention-deficit/ hyperactivity disorder exhibited greater improvement in executive function than other populations. Effects were generally larger for low- and moderate-intensity interventions. Shorter interventions (1–3 months) and exergames (video games that require physical movement) had the largest effects on general cognition and memory. Findings remained statistically significant after excluding reviews rated as low and critically low quality.

Conclusions: These findings provide strong evidence that exercise, even light intensity, benefits general cognition, memory and executive function across all populations, reinforcing exercise as an essential, inclusive recommendation for optimising cognitive health.

👉 **Structural brain improvements following individually tailored serious exergame-based training** in mild neurocognitive disorders: exploratory randomized controlled trial. Manser et al.; 2025
https://alzres.biomedcentral.com/articles/10.1186/s13195-025-01835-2

Results: Complete datasets from 30 study participants (72.0 ± 8.6 years; 27% females) were available. 87% of participants had biomarker-supported characterization of mNCD etiology– mostly Alzheimer's (62%). Significant moderate to large effects (partial eta-squared = 0.109 to 0.187) on GM/WM volumes were observed in the right and total hippocampus, thalamus, and anterior cingulate cortex in favor of 'Brain-IT' training. Hippocampal and thalamic changes correlated with improvements in verbal delayed recall. Protective effects on WM integrity, which correlated with cognitive improvements, were also observed, mainly around the thalamic radiation and the corpus callosum.

Conclusion: This is the first RCT showing that a co-designed, purpose-developed, and individually tailored exergame-based training may positively impact brain structures affected in mNCD, with potential associations suggestive of a causal link to cognitive improvements. Since hippocampal atrophy is a hallmark of Alzheimer's disease with high prognostic value for disease progression, our observations may be a first indication of a potential disease-modifying role of 'Brain-IT' training. However, adequately powered and hypothesis-driven studies are needed to build on these initial exploratory findings and better understand the neurobiological effects of exergame-based training.



MOŽDANI UDAR

👉 **PEMOCS: effects of a concept-guided, PErsonalized, MOtor-Cognitive exergame training on cognitive functions and gait in chronic Stroke—a randomized, controlled trial.** Huber et al.; 2025
https://pubmed.ncbi.nlm.nih.gov/40182756/

Among secondary outcomes, the mobility domain of the HRQoL questionnaire, intrinsic visual alertness, cognitive flexibility, working memory, and outdoor walking speed as well as swing width (unaffected side) showed significant interaction effects in favour of the exergame group.
Additional exergaming helped maintaining global cognitive functioning and showed encouraging effects in mobility and cognitive outcomes. Responders and non-responders did not differ in adherence, baseline values or age. Enhancing the frequency and intensity of sessions could unlock more substantial benefits. Adopting a blended therapy approach may be key to maximizing positive effects.

👉**Effect of dual task-based training on motor and cognitive function in stroke patients**: a systematic review and meta-analysis of randomized controlled trials. Mou, Jiang; 2025
https://pubmed.ncbi.nlm.nih.gov/40660174/

Results: 30 RCTs involving 1,588 people were included in the analysis. The study found that compared with the control group, dual-task cognitive motor training can improve the walking performance of stroke patients (WMD = 3.19, 95%CI: 2.26, 4.12), the recovery of lower limb motor function (WMD = 2.78, 95% CI: 1.38, 4.18), cognitive function (WMD = 2.93, 95% CI: 0.95, 4.91) and mental state (WMD = 3.39, 95% CI: 0.06, 6.72), and the functional state of activities of daily living (WMD = 7.47, 95% CI: 3.97, 10.96). Subgroup analyses showed that cognitive-motor dual-task training was more likely to have a clinical effect after at least 3 weeks of intervention.

Conclusions: Dual-task training significantly improves walking ability, lower limb motor function, cognitive function, mental status, and activities of daily living in stroke patients. No significant effects were found for basic mobility and gait speed. These findings support its clinical application, with personalized programs recommended based on patient needs.

Dual-Task Exercise Reduces Cognitive-Motor Interference in Walking and Falls After Stroke; Pang et al., 2018
https://pubmed.ncbi.nlm.nih.gov/30571419/

Results: Only the dual-task group exhibited reduced dual-task interference in walking time posttraining (forward walking combined with verbal fluency [9.5%, P=0.014], forward walking with serial-3-subtractions [9.6%, P=0.035], and the timed-up-and-go with verbal fluency [16.8%, P=0.001]). The improvements in dual-task walking were largely maintained at the 8-week follow-up. The dual-task cognitive performance showed no significant changes. The dual-task program reduced the risk of falls and injurious falls by 25.0% (95% CI, 3.1%–46.9%; P=0.037) and 22.2% (95% CI, 4.0%–38.4%; P=0.023), respectively, during the 6-month follow-up period compared with controls. There was no significant effect on other secondary outcomes (P>0.05).

Conclusions:The dual-task program was effective in improving dual-task mobility, reducing falls and fall-related injuries in ambulatory chronic stroke patients with intact cognition. It had no significant effect on activity participation or quality of life.

👉The Contribution of Paresis, Age, and the Effect of Short Training on Cognitive–Motor Dual-Task Interference After Stroke: A Pilot Study.
Judit Mally et al.;, 2025; Life MDPI

https://www.mdpi.com/2075-1729/15/12/1881

(Doprinos pareze, dobi i utjecaj kratkog treninga na kognitivno-motoričku interferenciju dvostrukih zadataka nakon moždanog udara: Pilot studija.)

Niz kognitivno-motoričkih testova (dual tasking - DT) provedeno je na 63 pacijenta nakon moždanog udara (PS) i 49 zdravih kontrolnih ispitanika odgovarajuće dobi. Pacijenti s parezom (P) i bez pareze (NP) uspoređeni su s kontrolnom skupinom prije i nakon intervencijskog treninga. Razlike između NP pacijenata i kontrolne skupine potvrdile su kognitivnu razliku, dok je usporedba između NP i P pacijenata potvrdila veće motoričko oštećenje kod P pacijenata. Stariji pacijenti postigli su lošije rezultate. Prema analizi, dob je bila važnija od pareze kod DT treninga. Kratkotrajni trening (nekoliko dana uzastopce kroz više tjedana) poboljšao je rezultate testa, posebno kod P pacijenata (povećana brzina reakcije i smanjuje grešaka).

After Dual-Task Training Comparison of Dual-Task Tests on Days 1 and 5					
				>65 Years	
		Day One			Day Five
Tests	Control	Non-Paretic	Paretic	Control	Non-Paret
Bird	1.5 ± 0.4	2.7 ± 1.2	3.1 ± 1.0	1.2 ± 0.1 ***	1.3 ± 0.3
Simple	0.9 ± 0.2	1.6 ± 0.4	2.3 ± 1.0	0.9 ± 0.1	1.0 ± 0.2
Divided	1.0 ± 0.1	1.5 ± 0.2	1.7 ± 0.4	0.9 ± 0.1 **	1.1 ± 0.2
Habitat	1.7 ± 0.2	2.0 ± 0.2	2.0 ± 0.4	1.6 ± 0.2 *	1.6 ± 0.2
Hits	74.3 ± 11.4	39.7 ± 17.0	28.5 ± 19.4	108.0 ± 12.7 ***	89.8 ± 19.2
Misses	13.5 ± 4.2	35.7 ± 14.1	44.4 ± 19.0	11.0 ± 5.3	14.5 ± 7.4

Zaključno:
Ovi rezultati sugeriraju prisutnost deficita pažnje i donošenja odluka kod PS pacijenata, dok je DT trening donio poboljšanja kod PS pacijenata, s najvećim učinkom u P skupini (s parezom).

ORTOPEDSKA REHABILITACIJA

👉**The effect of dual-task training in older adults with total hip arthroplasty**: a randomized controlled trial.
Uysal et al; 2025
10.1186/s12891-025-08279-7

Results: All evaluated parameters of the intervention group (VAS, HHS, MMSE, DTQ, cTUG, LEMOCOT, 4MWS, FTSST, and ABC) improved significantly after the intervention. Also, significant improvement was seen in all scores (VAS, HHS, MMSE, DTQ, cTUG, LEMOCOT, 4MWS, FTSST, and ABC) except for HHS-pain (0.059) and HHS-deformity (0.157) ($p < 0.05$) for the control group. The score change of the intervention group was significantly better for all evaluated parameters (VAS, HHS, MMSE, DTQ, LEMOCOT, 4MWS, FTSST, and ABC) ($p < 0.05$), except cTUG. All parameters of the intervention group were clinically meaningful regarding MCID values, except HHS-pain, HHS-living activities, and cTUG score change. Besides, HHS-pain, HHS-living activities, HHS-deformity, MMSE, LEMOCOT, FTSST, and ABC score change was not meaningful clinically.

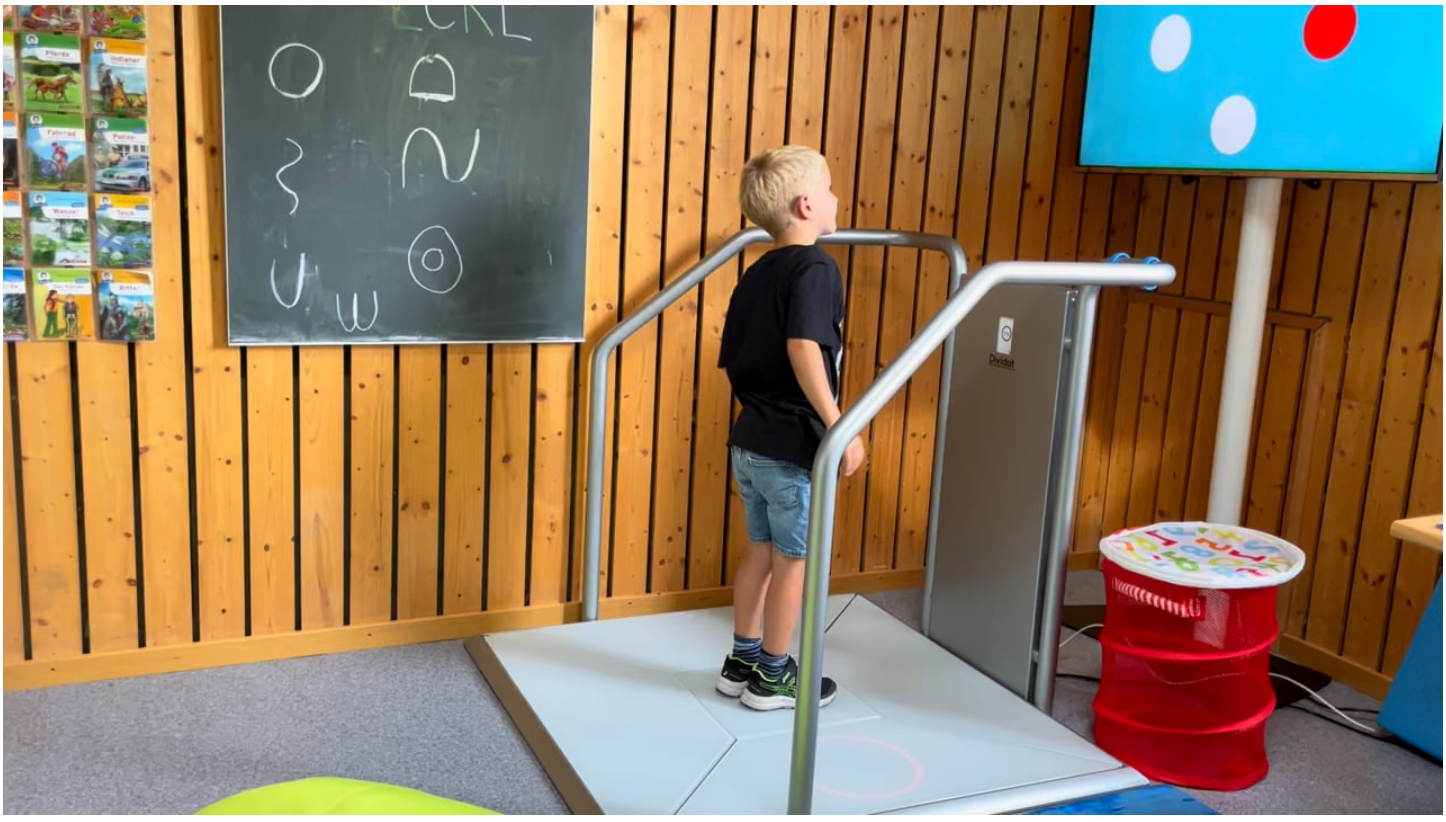
Conclusion: An eight-week dual-task training provides better results on pain, function, dual-task performance, motor coordination, gait, and balance than usual rehabilitation in patients after 6-weeks of THA. The results showed that patients after THA achieved improvements with gains in motor-cognitive function.

ADHD

👉 **The effect of exergaming on executive functions in children with ADHD**: A randomized clinic trial; Benzig, Schmidt, 2019
https://pubmed.ncbi.nlm.nih.gov/31050851/

Methods: In a parallel group randomized trial, 51 children between 8-12 years (M = 10.63; SD = 1.32) diagnosed with ADHD were assigned either to an 8-week exergame intervention group (three training sessions per week for 30 minutes) or a waiting-list control group. The core executive functions (inhibition, switching, updating), parent ratings of symptoms, and motor abilities were assessed/gathered before and after the intervention.

Conclusions: Findings indicate that exergaming might benefit two domains in which frequent deficits can be observed in children with ADHD, executive functions and motor abilities. Given that these beneficial effects in turn might positively affect psychopathology, exergaming could serve as an individualized home-based intervention in the future. However, in order to maximize benefits and make exergaming a valuable adjunct to treatment for children with ADHD, customized exergames are needed.



CEREBRALNA PARALIZA

👉 **Dual-Task Training Interventions for Cerebral Palsy**: A Systematic Review and Meta-Analysis of Effects on Postural Balance and Walking Speed. Cortes-Perez et al.; 2025
https://pubmed.ncbi.nlm.nih.gov/40870460/

Results: Eight RCTs, providing data from 216 children**,** were included. Meta-analyses suggested that DTT was more effective than conventional therapies for increasing functional (SMD = 0.65; 95% CI 0.18 to 1.13), dynamic (SMD = 0.61; 95% CI 0.15 to 1.1), and static balance (SMD = 0.46; 95% CI 0.02 to 0.9), as well as standing (SMD = 0.75; 95% CI 0.31 to 1.18; *p* = 0.001) and locomotion dimensions (SMD = 0.65; 95% CI 0.22 to 1.08) of the Gross Motor Function Measure (GMFM) and walking speed (SMD = 0.46; 95% CI 0.06 to 0.87). Subgroup analyses revealed that a motor-cognitive dual task is better than a motor single task for functional, dynamic, and static balance and standing and locomotion dimensions for the GMFM.

Conclusions: This SRMA, including the major number of RCTs to date, suggests that DTT is effective in increasing balance, walking and gross motor function-related balance in children with CP.

👉 **The effectiveness of dual task exercise training on balance, mobility, physical performance, and quality of life in children with cerebral palsy**: a single-blind randomized controlled trial; Uysal et al., 2023
https://pubmed.ncbi.nlm.nih.gov/37777679/

Results: DTG demonstrated significantly improved all KINDL scores ($p < 0.01$). In comparisons between groups adjusted analysis, results showed a better improvement of all KINDL scores in-favor-of DTG ($p < 0.01$). Significant improvements were found in all SLST scores and PBS in DTG ($p < 0.01$). Adjusted analysis results proved there was a significant improvement in all balance scores on behalf of DTG ($p < 0.01$). Significant improvement was observed in DTG for TUG, 3MBWT, and 6MWT scores ($p = 0.001$). An improvement in-favor-of DTG was found for all performance tests in the adjusted analysis ($p < 0.001$).

Conclusion: The results of this randomized controlled trial highlighted the advantage of dual-task training on balance, physical performance, and quality of life in children with CP.

👉 **Dual-task training effect on gait parameters in children with spastic diplegic cerebral palsy:** Preliminary results of a self-controlled study; Okur et al., 2022
https://pubmed.ncbi.nlm.nih.gov/35247824/

Results: The difference in step length, step time, stride time, cadence and gait speed of spatiotemporal parameters of gait during dual-task performance were found statistically significant in children with spastic diplegic CP, after dual-task training program ($p < 0,05$). After dual-task training, statistically significant gains were found in 1MWT, movement and balance subtitle of PedsQL-CP module Parent Form ($p < 0,05$).

Significance: Dual-task training program added to a conventional physiotherapy program provides more gains in terms of functionality of children with spastic diplegic CP will contribute to the improvement of the motor functional level.

PARKINSONOVA BOLEST

👉 **Feasibility and efects** of cognitive– motor exergames on fall risk factors in typical and atypical Parkinson's inpatients: a randomized controlled pilot study, Jaggi et al., 2023
https://dividat.com/en/news/feasibility-and-effects-of-cognitive-motor-exergames-on-fall-risk-factors-in-typical-and-atypical-parkinsons-inpatients

Results: Thirteen patients [median: 68.0 (IQR: 49.5–73.5) years, median: 34.5 (IQR: 12.25–90.75) months post-stroke] were included, of whom ten completed the study. Rates for inclusion (57%), adherence (95%), compliance (99%), motivation (77%), and satisfaction (74%) were acceptable, however, the attrition rate was high (23%). The perceived motor and cognitive task difficulty predominantly moved below the targeted range. We found a significant change in the TUG ($p = 0.05$, $r = 0.46$) and medium-tolarge effect sizes ($p > 0.05$) for swing time of the affected leg, the asymmetry index, time needed for the Trail-making test (TMT) A and accuracy for the TMT B and the Mental Rotation Test (MRT; $0.26 \leq r \leq 0.46$).

Exergaming, as applied in this study, showed to be feasible, safe and likely efective for the improvement of cognitive and motor functions of PD inpatients. Because of this future randomized controlled trials with a main focus on testing the efcacy of this new intervention are warranted.

👉**A Review of Recent Advances in Cognitive-Motor Dual-Tasking for Parkinson's Disease Rehabilitation**. Tan et al., 2024
https://pubmed.ncbi.nlm.nih.gov/39409390/

Results: Dual-task training enhances Parkinson's disease (PD) rehabilitation by automating movements and minimizing secondary task interference. The inclusion of a sensor system provides real-time feedback to help patients make immediate adjustments during training. Furthermore, CADT promotes more vigorous participation and commitment to training exercises, especially those that are repetitive and can lead to patient boredom and demotivation. Virtual reality-tailored tasks, closely mirroring everyday challenges, facilitate more efficient patient adaptation post-rehabilitation.

Conclusions: Although the current studies are limited by small sample sizes and low levels, CADT rehabilitation presents as a significant, effective, and potential strategy for PD.

MULTIPLA SKLEROZA

👉 **Effects of dual-task training on balance, gait, dual-task performance, cognitive function, fatigue in individuals with multiple sclerosis**: A randomized controlled trial: Dual-Task Training in MS; EKICI ET AL., 2025 https://pubmed.ncbi.nlm.nih.gov/40737966/

Results: Five participants dropped out, leaving 27 for final analysis (DTTG n=13, CG n=14). Significant improvements in the BBS (p<0.001), FSS (p=0.002), BICAMS (p<0.001), and 10MWT (p=0.019) favored the DTTG. No significant differences were observed in TUG (p=0.085), FI (p=0.616), or DTQ (p=0.402).

Conclusions: An 8-week motor-motor and motor-cognitive dual-task training program combined with home exercise effectively enhances cognitive function, balance, fatigue, and walking speed in pwMS, supporting its inclusion in rehabilitation program.

👉 **Cognitive-motor dual-task training improves dynamic stability during straight and curved gait in patients with multiple sclerosis**: a randomized controlled trial; Tramontano et al., 2023 https://pubmed.ncbi.nlm.nih.gov/37997324/

Results: Thirty-one PwMS completed the trial at T2. Significant improvement within subjects was found in Mini-BESTest scores for DTg from T0 to T1. The IMU-based assessment indicated significant differences in stability (P<0.01) and smoothness (P<0.05) measures between CTg and DTg during 10mWT and Fo8WT. Substantial improvements (P<0.017) were also found in the inter-session comparison, primarily for DTg, particularly for stability, symmetry, and smoothness measures.

Conclusions: This study supports the effectiveness of DT in promoting dynamic motor abilities in PwMS.

Clinical rehabilitation impact: Cognitive-motor DT implemented into the neurorehabilitation conventional program could be a useful strategy for gait and balance rehabilitation.

👉 **Design and Evaluation of User-Centered Exergames for Patients With Multiple Sclerosis**: Multilevel Usability and Feasibility Studies, Schattin et. al., 2021 https://pubmed.ncbi.nlm.nih.gov/33960956/

Results: In the first study (N=16), usability was acceptable, with a median SUS score of 71.3 (IQR 58.8-80.0). In the second study (N=25), the median SUS scores were 89.7 (IQR 78.8-95.0; before) and 82.5 (IQR 77.5-90.0; after), and thus, a significant decrease was observed after training (z=-2.077; P=.04; r=0.42). Moreover, high values were observed for the overall FSS (pre: median 5.9, IQR 4.6-6.4; post: median 5.8, IQR 5.4-6.2) and overall Game Flow Questionnaire (pre: median 5.0, IQR 4.7-5.3; post: median 5.1, IQR 4.9-5.3). A significant decrease was observed in the item perceived importance (FSS: z=-2.118; P=.03; r=0.42). Interviews revealed that user-centered exergames were usable, well accepted, and enjoyable. Points of reference were identified for future research and development.

Conclusions: The project revealed that the newly developed, user-centered exergames were usable and feasible for patients with MS. Furthermore, exergame elements should be considered in the development phase of user-centered exergames (for patients with MS). Future studies are needed to provide indications about the efficacy of user-centered exergames for patients with MS.

👉 **Effects of a 6-month exercise program on patients with multiple sclerosis**, RCT**.** Romberg et al., 2024
https://pubmed.ncbi.nlm.nih.gov/15596746/

Results: Ninety-one (96%) of the 95 patients entering the study completed it. Change between groups was significant in the 7.62 m (p = 0.04) and 500 m walk tests (p = 0.01). In the 7.62 m walk test, 22% of the exercising patients showed clinically meaningful improvements. The exercise group also showed increased upper extremity endurance as compared to controls. No other noteworthy exercise-induced changes were observed. Exercise adherence varied considerably among the exercisers.

Conclusions: Walking speed improved in this randomized study. The results confirm that exercise is safe for multiple sclerosis patients and should be recommended for those with mild to moderate disability.

SPORT: TESTIRANJE, PREVENCIJA, REHABILITACIJA

👉 **The effects of cognitive-motor dual-task training on athletes' cognition and motor performance.** Wu et al.; 2024
https://pubmed.ncbi.nlm.nih.gov/38390413/

Results: After screening 2,094 articles, we included 10 acute studies and 7 chronic studies.

Conclusion: This systematic review shows that athletes typically show a degradation of performance in CMDT situations as opposed to ST when evaluated transversally. However, this performance decline is notably reduced following longitudinal training in CMDT, indicating the effectiveness of sustained CMDT training in enhancing cognitive-motor performance under dual-task conditions. Our study provides new insights into the application of CMDT in the field of sports training. Practitioners can utilize CMDT to assess athletic skill levels or optimize cognitive-motor performance of athletes, taking into account the specific needs of each sport.

👉 **Dual-Task Assessment in ACL Rehabilitation: A Step Towards Reducing Re-Injury Risk.** Ricupito et al.; 2024.
https://pubmed.ncbi.nlm.nih.gov/39758699/

Key Findings and Clinical Implications:

- Performance Differences Between Limbs: As expected, THD (triple hop distance) performance was significantly better in the healthy limb compared to the operated limb under both ST and DT conditions. However, an unexpected finding was that the dual-task cost (DTC) was lower for the post-operative limb, suggesting that the injured limb may have adapted better to cognitive-motor challenges due to targeted rehabilitation interventions.
- Impact of Neurocognitive Training: Patients in this study had incorporated neurocognitive training into their rehabilitation, which likely contributed to the post-operative limb's improved adaptability to DT conditions. This underscores the importance of integrating cognitive challenges into ACL rehabilitation to enhance motor control and decision-making under stress.
- Implications for Re-Injury Prevention: Since cognitive overload can increase injury risk, incorporating neurocognitive elements into functional testing may provide a more accurate assessment of an athlete's ability to handle real-world demands. Future research should explore the impact of dual-task training on re-injury rates and long-term functional outcomes.

👉 **Effects of Anticipation and DualTasking on Lower Limb Biomechanics While Performing ChangeofDirection Tasks in Physically Active Individuals**: A Systematic Review with MetaAnalysis; Ebner et al.; 2025
https://pubmed.ncbi.nlm.nih.gov/40111742/

Results: The meta-analysis included 17 studies involving 355 individuals from different sports (e.g., soccer, American Football). No statistically significant differences were found between unanticipated and anticipated CODs for knee abduction and flexion moments as well as knee abduction angles ($p > 0.05$). Significantly higher knee flexion angles were found in unanticipated CODs (SMD = 0.74, 95% CI: 0.30-1.19; $p < 0.01$). Qualitative analyses of six studies including 171 individuals provided initial evidence for higher knee abduction moments and flexion angles during anticipated CODs while performing a secondary task concurrently.

Conclusion: Findings from quantitative and qualitative analyses indicate that anticipation and dual-tasking during COD performance have an impact on injury-related aspects of lower limb biomechanics. Hence, cognitive challenges should be implemented in injury risk screening and preventive strategies. Further studies with high methodological quality are needed to improve the understanding of the biomechanical and cognitive interplay in injury-threatening situations.

👉 Cognitive Motor Dual Tasking as a Game-Changer in Basketball Training Programs: A New Approach to Developing Elite Basketball Players; Shalom et al.; 2025
https://doi.org/10.3389/fpsyg.2025.1665556

At the highest levels of competition, what truly separates excellent players from the rest is their ability to produce explosive power as a quick response to unexpected situations, while also making accurate decisions under pressure (Haugan et al., 2025). A successful player is not defined by physical strength alone, but by the ability to combine high power with quick perception, psychomotor responsiveness, and cognitive control in unpredictable, open-skill environments. In this sense, cognitive performance is not a secondary element but rather a central part of developing elite level players, and accordingly, the perception of cognitive effort should be taken into account. (Halperin & Vigotsky, 2024;Zhang et al., 2025).

The CMDT training shows high potential not only for enhancing performance in dynamic contexts, but also as a rehabilitative tool during return-to-play processes. Even when physical limitations exist, the brain can continue to be trained through relevant movement-based tasks, helping to maintain or even strengthen specific skills that are still trainable.

SCHIZOFRENIJA

Feasibility and acceptability of an exergame intervention for schizophrenia.
Carlos Campos et al, 2015

- Feasibility/acceptability of Exergames for schizophrenia outpatients was established.
- Subjects found this tool reliable to promote physical activity and healthier lifestyles
- Most subjects reported that they experienced at least 1 specific intervention effect.

Exergames and their effect on emotional state in people with schizophrenia.
Charikleia Patsi et al, 2011

- The sample of the study was 8 people with schizophrenia, aged 35 to 63 years old. The exergame Nintento Wii was used for this purpose and a private structured interview by a psychiatrist was carried out.
- The duration of the study was 18 weeks, with a frequency of 3 times per week and the time the participants played with the exergame was 40 minutes. The results of the study showed that the exergame improved the emotional state, mood and social skills of people with schizophrenia.

Exergaming (physically active video gaming) for mental health service users in a community mental health care setting. Seren Haf Roberts et al, 2023

- We provide evidence that exergaming engages people with severe mental illness with physical activity. The value, acceptability and feasibility of open access exergaming in a community mental health service context is supported. Facilitating exergaming has the potential to increase physical activity for mental health service users leading to possible additional health benefits.