With the prevalence of dementia increasing each year, carefully designed therapeutic intervention strategies are of the utmost importance for halting pathophysiological and clinical symptom decline. Recent research is shifting focus towards preclinical dementia for clues about its prevention. Ideally intervention should be implemented before the onset of symptoms, since research indicates that there is a large amount of time (i.e. years or decades) that exists before disease-related neurodegeneration occurs to the extent of causing behavioural deficits. The focus of the present study is to characterize how a movement control-based behavioural intervention program may influence visuomotor skill performance in those who are at high-risk of developing dementia. The design of the study employs a novel approach which requires participants to perform cognitive-motor integration (CMI) on visuomotor tasks with increasing levels of complexity. Research has shown that optimal functioning of frontoparietal association networks in the brain are required to perform CMI tasks. Since these communicative brain networks typically are the first to display symptoms of decline related to behavioural impairment, it seems plausible that engaging in CMI tasks may be useful for stimulating communication between relevant brain areas. This repeated stimulation is expected to enhance visuomotor performance ability and improve brain health globally. For this study, participants are placed in an experimental training group based on reported maternal/multiple family member history of diagnosed dementia. Participants and a age/sex-matched control group (no family history of dementia) did a 16-week training program in which they played a video game requiring CMI. This training was performed for 30 minutes, twice a week, for 4 months. A second cognitively healthy control group will do a pre-and post-test batteries, but not the training program. The pre-and post-test battery is used to assess cognitive processing and visuomotor ability. These findings will add to the current research on functional decline prevention in individuals facing neurodegenerative disease.