Appendix H: Exercise and Physical Training Interventions

Different approaches to exercise and physical training interventions with varying degrees of effectiveness are described in the literature. The interventions are outlined in alphabetical order in **Table 18**.

Table 18: Exercise and Physical Training Interventions

TYPE OF TRAINING OR EXERCISE INTERVENTION	DEFINITION	POTENTIAL BENEFITS
Core strength training and Pilates exercise training	Core strength training includes exercises targeted at strengthening the core. "The core can be described as a muscular box with the abdominals in the front, paraspinals and glutes in the back, the diaphragm as the roof, and the pelvic floor and hip girdle musculature as the bottom" (Granacher, Gollhofer, Hortobagyi, Kressig, & Muehlbauer, 2013, p. 628). "Pilates-based exercises are designed to promote core stability/strength, flexibility, coordination, and balance. It is practiced on mats and/or with different types of Pilates apparatus (e.g., reformer, Pilates ring)" (Granacher et al., 2013, p. 628).	Mitigates deficits in measures of trunk muscle (core) strength, balance, functional performance, and falls (Barker, Bird, & Talevski, 2015; Bullo et al., 2015; Granacher et al., 2013). Increases muscle strength, walking and gait performance, dynamic balance, static balance, and flexibility in older adults (Bullo et al., 2015). Other potential benefits are improved functional capacity to perform activities of daily living and improved quality of life (Bullo et al., 2015).
Exergaming (interactive gaming)	The use of virtual reality-based games or computer programs (e.g., Nintendo Wii Fit) aimed at enhancing standing balance performance by providing immediate and interactive feedback (visual, auditory, or proprioceptive) to the user.	Enhances balance capabilities (Dennett & Taylor, 2015; Laufer, Dar, & Kodesh, 2014; Pietrzak, Cotea, & Pullman, 2014b). Requires supervision and careful selection of appropriate games (Laufer et al., 2014; Pietrzak et al., 2014b).

TYPE OF TRAINING OR EXERCISE INTERVENTION	DEFINITION	POTENTIAL BENEFITS
Falls prevention exercise programs	Multicomponent group or individual exercise programs that include gait and functional training, strengthening exercises, flexibility, and endurance or tai chi aimed at targeted falls risk factors (El-Khoury et al., 2013).	Reduced rate of falls, prevention of injury caused by falls (El-Khoury et al., 2013; U.S. Preventive Services Task Force, 2012). Effective for falls prevention, quality-of-life enhancement, and balance improvements in older adults (Martin et al., 2013). Group-based exercise promotes greater patient satisfaction and exercise adherence (Martin et al., 2013).
Foot and ankle exercises that strengthen and stretch the foot and ankle	Exercises that strengthen and stretch the foot and ankle.	Improves balance performance and ankle flexibility, and may help to reduce falls (Schwenk et al., 2013). Shown to be beneficial as part of multi-faceted podiatry care for people with disabling foot pain (Gillespie et al., 2012).
Individualized exercise or physiotherapy (home-based)	Exercise tailored to the person's needs and capabilities (different exercises selected based on assessment and modified based on individual progress); targets a reduction in falls (and/or) risk for falls.	Improves physical performance and function, including balance, leg strength, and physical activity (Hill, Hunter, Batchelor, Cavalheri, & Burton, 2015; U.S. Preventive Services Task Force, 2012).
Interactive cognitive–motor interventions (ICMI)	Examples of ICMI include step training, use of a balance board, and multicomponent and aerobic programs.	Improves physical and cognitive falls risk factors in older people, but it is unclear to what extent this reduces falls. These interventions particularly improve balance and strength, and have benefits equivalent to traditional training programs (Schoene, Valenzuela, Lord, & de Bruin, 2014). One potential risk involves possible feelings of increased sway after some training. Two studies reported an increase in sway after cognitive–motor training. Although this could potentially increase falls risk, it might also be associated with improved compensatory strategies (Schoene et al., 2014).

TYPE OF TRAINING OR EXERCISE INTERVENTION	DEFINITION	POTENTIAL BENEFITS
Muscle strengthening	Exercises that strengthen lower-limb muscles.	Lower-limb strengthening exercises reduce falls (Ishigaki, Ramos, Carvalho, & Lunardi, 2014).
Perturbation-based balance training	"A novel balance training intervention that incorporates exposure to repeated postural perturbations (something that causes disequilibrium in posture) to evoke rapid balance reactions, enabling the individual to improve control of these reactions with practice" (Mansfield et al., 2015, p. 701).	Reduces the likelihood and frequency of falling (Mansfield et al., 2015).
Stepping training	Stepping training aims to mimic a falls situation. Stepping interventions include reactive step training (using a body harness and supervision, and large expensive equipment) and volitional step training, which can be used in exercise classes or by individuals at home (Okubo, Schoene, & Lord, 2016).	Improves reaction time, gait, balance, and balance recovery, and was found to reduce falls in older adults by approximately 50 percent (Okubo et al., 2016). Context is important, as reactive step training would not be feasible in most settings. Also, findings are applicable mostly to healthy and high-risk older adults with balance and gait impairments or frailty, living in the community and in institutional settings, but not necessarily to people with certain conditions such as Parkinson's disease, stroke, dementia, and other cognitive impairments (Okubo et al., 2016).

TYPE OF TRAINING OR EXERCISE INTERVENTION	DEFINITION	POTENTIAL BENEFITS
Tai chi (alternate names: taiji, tai chi chuan)	"A traditional Chinese martial art involving slow and continuous but highly choreographed movements that incorporate unilateral and bilateral weight shift as well as trunk and extremity rotation" (Leung, Chan, Tsang, Tsang, & Jones, 2011, p. 40).	Increases balance confidence (i.e., "the perceived ability to perform activities without losing balance") (Rand, Miller, Yiu, & Eng, 2011, p. 297). Improves balance control (Huang & Liu, 2015; Leung et al., 2011; Song et al., 2015). Improves flexibility (Huang & Liu, 2015; Leung et al., 2011). Reduces falls and fear of falling; best suited if a person is not frail (Leung et al., 2011; Schleicher, Wedam, & Wu, 2012). Effective for people at lower risk for falls (Gillespie et al., 2012).
Yoga	"Yoga-based activity takes many forms, ranging from the practice of standing postures that aim to improve strength, flexibility and balance through to relaxation and meditation-based form" (Youkhana, Dean, Wolff, Sherrington, & Tiedemann, 2016, p. 22).	Results in small improvements in balance and medium improvements in physical mobility (Youkhana et al., 2016).