Appendix 1. Search Strategies in PubMed and PEDro Databases

PubMed/ Medline search strategy

		Key Terms	Results
1	Concept 1: Technique	Virtual Reality	10398
2		Virtual Realities	79
3		VR	8318
4		Virtual Environment	7714
5		Virtual Reality Immersion therapy	943
6		Instructional Virtual Reality	10398
7		Serious Games	952
8		Kinect	985
9		Wii	816
10		PlayStation	72
11		Video games	6304
12		Active games	1352
13		Computer games	7957
14		Computer simulation	247985
15		Tele rehabilitation	1054
16		Exercise gaming	370
17		Eye toy	187
18	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17		305502
19	Concept 2: Disease	Cerebral Palsy	29203
20		CP	74213
21		Little disease	131706
22		Little's disease	29215
23		Infantile Palsies	1157
24		Spastic Hemiplegia	15294

25		Spastic Hemiplegic	602
26		Spastic diplegia	29442
27		Spastic diplegic	507
28		Spastic Paraplegia	21653
29	19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28		294845
30	Concept 3: Function	Balance	244476
31		Gait	59041
32		Walking	92610
33		Walk	120946
34		Ambulation	102373
35		Gross Motor Function	5890
36		Leg	156888
37		Lower Extremity	187805
38		Trunk	237638
39		Torso	189989
40		Core	311758
41		Posture	90717
42		Postural Control	17797
43	30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42		1440597
44	18 AND 28 AND 42		504
45	Limit >2010		388
46	Limit RCT		45
47	Limit English		499
48	44 AND 45 AND 46 AND 47		41

PEDro search strategy

Key Terms	Results
Virtual Reality AND Cerebral Palsy	35
Serious Games AND Cerebral Palsy	3
Tele Rehabilitation AND Cerebral Palsy	2
PlayStation AND Cerebral Palsy	1
Wii AND Cerebral Palsy	12
Virtual Reality AND Little Disease	2
Virtual Reality AND Balance with Cerebral Palsy	14
Virtual Reality AND Gait with Cerebral Palsy	4
Virtual Reality AND Ambulation with Cerebral Palsy	2
Virtual Reality AND Postural Control with Cerebral Palsy	5

Appendix 2. Reasons of Exclusion of Papers

Full Text Not Available	
Two models of virtual reality devices for therapeutics in persons with cerebral palsy	
Total Number	**1**

Language Other Than English	
Effects of virtual reality training on limb movement in children with spastic diplegia cerebral palsy)	
Total Number	**1**

Inappropriate Outcome Measure	
1. Effectiveness of a low-cost virtual reality system for children with developmental delay: a preliminary randomised... 2. Efficacy of home-based virtual cycling training on bone mineral density in ambulatory children with cerebral palsy. 3. Exercise Intensity Levels in Children With Cerebral Palsy While Playing With an Active Video Game Console 4. Feasibility of a randomised controlled trial to evaluate home-based virtual reality therapy in children with cerebral palsy 5. Improved Physiology and Psychosocial Well-Being for Children with Physical Disabilities Through Virtual Reality Immersion 6. Influence of virtual reality soccer game on walking performance in robotic assisted gait training for children	
Total Number	**6**

Inappropriate Paper's Design	
1. Can non-immersive virtual reality improve physical outcomes of rehabilitation? 2. Effect of transcranial direct current stimulation combined with gait and mobility training on functionality in children with cerebral palsy 3. Effectiveness of virtual reality rehabilitation for children and adolescents with cerebral palsy: an updated evidence-based... 4. Exercise training and heart failure: a systematic review of current evidence (Structured abstract). 5. Interactive Rehabilitation System for Improvement of Balance Therapies in People With Cerebral Palsy 6. Review of effects of physical activity on strength, balance, mobility and ADL performance in elderly subjects with dementia (Structured abstract). 7. Seat inclinations affect the function of children with cerebral palsy: a review of the effect of different seat inclines (Structured abstract). 8. The contributions of game therapy concerning motor performance of individual with cerebral palsy 1 9. The effects of virtual reality game training on trunk to pelvis coupling in a child with cerebral palsy 10. The feasibility and effectiveness of Wii fit balance games on standing postural control rehabilitation for children with cerebral palsy 11. Using Gait and Balance Technologies to Benefit the Pediatric Population: Technologies for assessment and therapy can be... 12. Using the Wii Fit as a tool for balance assessment and neurorehabilitation: the first half decade of "Wii-search" 13. Virtual reality and gaming systems to improve walking and mobility for people with musculoskeletal and neuromuscular conditions 14. Virtual reality as a therapeutic modality for children with cerebral palsy 15. Virtual reality interface devices in the reorganization of neural networks in the brain of patients with neurological diseases	
Total Number	**15**

Population Other Than CP	
1. A synthesis of the effects of occupational therapy for persons with stroke. Part II: remediation of impairments (Structured abstract). 2. Additional virtual reality training using Xbox Kinect in stroke survivors with hemiplegia 3. Assessing the gaming experience of a serious exergame for balance problems: Results of a preliminary study 4. Effectiveness of a Wii balance board-based system (eBaViR) for balance rehabilitation: a pilot randomized clinical trial in... 5. Effects of Game-Based Constraint-Induced Movement Therapy on Balance in Patients with Stroke: A Single-Blind Randomized Controlled Trial. 6. Effects of Home-based Telesupervising Rehabilitation on Physical Function for Stroke Survivors with Hemiplegia: A Randomized Controlled Trial. 7. Effects of Virtual Reality Training using Xbox Kinect on Motor Function in Stroke Survivors: A Preliminary Study. 8. Feasibility of Using Tetrax Biofeedback Video Games for Balance Training in Patients With Chronic Hemiplegic Stroke. 9. Randomized controlled trial of web-based multimodal therapy for children with acquired brain injury to improve gross motor capacity and performance. 10. Virtual reality improves embodiment and neuropathic pain caused by spinal cord injury. 11. Virtual reality in stroke rehabilitation: still more virtual than real 12. Virtual Reality Rehabilitation With Functional Electrical Stimulation Improves Upper Extremity Function in Patients With Chronic Stroke: A Pilot Randomized Controlled Study.	
Total Number	**12**

Inappropriate Protocol
1. Caregiver-directed home-based intensive bimanual training in young children with unilateral spastic cerebral palsy: a randomized trial [with consumer summary] 2. Children with developmental coordination disorder play active virtual reality games differently than children with typical... 3. Clinical usefulness of brain-computer interface-controlled functional electrical stimulation for improving brain activity in children with spastic cerebral palsy... 4. Designing for engaging BCI training: A jigsaw puzzle 5. Does horseback riding therapy or therapist-directed hippotherapy rehabilitate children with cerebral palsy? (Structured abstract). 6. Effect of Wii training on hand function in children with hemiplegic cerebral palsy 7. Effectiveness of commercially available gaming devices in upper limb stroke rehabilitation (Provisional abstract). 8. Effects of conventional neurological treatment and a virtual reality training program on eye-hand coordination in children with cerebral palsy 9. Effects of modified constraint-induced movement therapy in virtual environment on upper-limb function in children with spastic hemiparetic cerebral palsy: a randomised controlled trial 10. Efficacy of neurodevelopmental treatment combined with the Nintendo® Wii in patients with cerebral palsy 11. Home-based Nintendo Wii training to improve upper-limb function in children ages 7 to 12 with spastic hemiplegic cerebral palsy 12. Home-Based Versus Laboratory-Based Robotic Ankle Training for Children With Cerebral Palsy: A Pilot Randomized Comparative Trial. 13. Impact of virtual reality games as an adjunct treatment tool on upper extremity function of spastic hemiplegic children 14. Impaired visually guided weight-shifting ability in children with cerebral palsy 15. Interfacing a haptic robotic system with complex virtual environments to treat impaired upper extremity motor function in children with cerebral palsy 16. Mitii™ ABI: study protocol of a randomised controlled trial of a web-based multi-modal training program for children and adolescents with an Acquired Brain Injury (ABI). 17. Pediatric rehabilitation with the reachMAN's modular handle 18. The Effect of Vestibular Stimulation on Motor Functions of Children With Cerebral Palsy 19. The effects of virtual reality-based bilateral arm training on hemiplegic children's upper limb motor skills 20. The nature of arm movement in children with cerebral palsy when using computer-generated exercise games 21. The use of virtual reality with children with cerebral palsy: a pilot randomized trial

22. Training the equidistant principle of number line spacing. 23. Upper limb training using Wii Sports Resort for children with hemiplegic cerebral palsy: a randomized, single-blind trial 24. Using commercial video games for upper limb stroke rehabilitation: is this the way of the future? (Provisional abstract). 25. Using health games for rehabilitation of patients with infantile cerebral palsy 26. Video-game based therapy performed by children with cerebral palsy: a cross-over randomized controlled trial and a cross-sectional quantitative measure of physical activity. 27. Virtual reality as adjunctive therapy for upper limb rehabilitation in cerebral palsy	
Total Number	**27**

Appendix 3. Review Results

Researchers	Subjects' Characteristics			Protocols			Outcome Measures	Results
	Number/Age/ Gender	CP sub-Types	GMFCS	Experimental	Control	Settings		
Valeska et al., 2017 (Gatica-Rojas et al., 2017)	**N**= 32 **Age:** 10.7 ±3.2 Y **Gender:** both	SDI & SHE	Not specified	**Therapy:** VR **Device:** "Nintendo Wii balance board" **Games:** Snowboard, Penguin Slide, and Super Hula Hoop games and Yoga with breathing exercises	SPT	VR: 30 min/s, SPT: 40 min/s Three s/w 6 wks.	Body sway: • CoP_{sway} • SD_{ML} & SD_{AP} • V_{ML} & V_{AP}	**Immediate effect:** sig. ↓ CoP_{sway} and SD_{AP} in EG **Effect over time:** **SPT:** No effect over time **EG:** • **EO/EC:** ↓ CoP_{sway} >> effects wane with time • **SHE:** sig. ↓ in CoP_{sway} and in SD_{AP} • **SDI:** no sig. effect
Lazzari et al., 2016 (Lazzari et al., 2017)	**N**= 20 **Age:** 4–12 Y **Gender:** 6 ♀ & 14 ♂	All	I, II, III	**Therapy:** Xbox 360 with Active tDCS **Game:** "Your Shape: Fitness Evolved 2012"	**Therapy:** Xbox 360 with Sham tDCS **Game:** "Your Shape: Fitness Evolved 2012"	20 min/s, 5s/w 2 wks.	1) Body sway: • CoP_{sway} • SD_{ML} & SD_{AP} • V_{ML} & V_{AP} 2) PBS, 3) TUGT	Sig. changes in EG: • ***PBS:*** *d = 0.46* • ***TUGT:*** *p<0.05* • $\boldsymbol{CoP_{sway}}$ with EO
Grecco et al., 2015 (Grecco et al., 2014)	**N**= 24 **Age:** > 8 Y **Gender:** 9 ♀ & 11 ♂	SDI	II, III	**Therapy:** Xbox 360 + Active tDCS **Game:** Racetrack	**Therapy:** Xbox 360 + Sham tDCS **Game:** Racetrack	20 min/s, 5 s/w, 2 wks.	*Gait analysis* *GMFM*	Sig. changes at post-treatment and follow-up in: • ***Gait-****velocity* & cadence**:** p<0.05 • ***GMFM – D:*** *d = 0.61,* • ***GMFM – E*** **:** d= 0.91
AlSAif et al., 2015 (AlSaif & Alsenany, 2015)	**N**= 40 **Age:** 6-10 Y **Gender:** both	SDI	III	**Therapy:** VR **Device:** Nintendo Wii Fit	No training	20 min/s 7 s/w 12 wks.	mABC-2 1-minute walk test	**Post-treatment**: sig. changes in ***1-MWT*** (d=1.01) and ***mABC-2*** (p<0.05) **Follow up: s**ig. differences between groups
Uysal, 2016 (Atasavun Uysal & Baltaci, 2016)	**N**= 24 **Age:** 6-14 Y **Gender:** 14 ♀, 10 ♂	SHE	I, II	**Therapy:** VR + NDT **Device:** Nintendo Wii Fit **Games:** basketball, tennis, and boxing	NDT	30 min/s. (VR) + 45 min/s (NDT) 2 s/w 12 wks.	PEDI (mobility) PBS	**Sig. changes in EG vs. CG** • ***PBS:*** d= 1.55, • ***PEDI*** **–** Mobility: p<0.05

Arnoni et al., 2019 (Arnoni et al., 2019)	**N**= 15 **Age:** 10 ± 3 Y **Gender:** both	SHE	I, II	**Therapy:** VR + SPT Device: PC **Games:** gaming platform using a series of simulated tasks	SPT	50 min/s 2 s/w,	Force plate, GMFM -D & E	***Force plate variables:*** Not sig. main effects ***GMFM:*** sig. ↑ in EG (D= 10.8%; E= 14.0%)
Wade et al., 2012 (Wade & Porter, 2012)	**N**= 13 **Age:** 5 - 16 Y **Gender:** both	Not specified	IV, V	**Therapy:** VR **Device:** "Cushion" containing a platform placed in the wheelchair seat. **Game:** move a ball around a maze.	No intervention. Monitoring of activity participation	3 months	Chailey Levels of Ability SACND	**Chailey levels in sitting:** Sig. ↑ (shoulder girdle position and spinal profile) **SACND:** sig. ↑ in five elements of the reach and rest phases.
Pin et al., 2019 (Pin & Butler, 2019)	**N**= 18 **Age:** 6-14 Y **Gender:** both	Bilateral spastic CP	III, IV	**Therapy:** VR + SPT **Device:** PC **Games:** interactive computer games in sitting	SPT	20 min/s 4 s/w, 6 wks.	PRT, GMFM–66 2-MWT	**2-MWT and GMFM-66:** *d = 0.11* **Weeks 3, 6 & 12:** no sig difference btw groups
Jelsma et al., 2013 (Jelsma et al., 2013)	**N**= 14 **Age:** 7-14 Y **Gender:** both	SHE	I, II	**Therapy:** VR + regular PT **Device:** Nintendo Wii Fit	Regular PT	25 min/s 4 s/w, 9 wks.	BOT-2 (balance subtest) TUDS	***BOT-2:*** sig difference in EG ***TUDS:*** 6 children showed medium to large ↑
Cho et al., 2016 (Cho et al., 2016)	**N**= 18 $M_{age}EG = 10.2\,Y$ $M_{age}\,CG = 9.4\,Y$ **Gender:** both	Spastic CP	I, III	**Therapy:** VRTT + CPT	TT + CPT	30 min/s, 3 s/w, 8 wks.	GMFM, PBS, 10-MWT, 2-MWT	Sig. changes in the EG: • ***GMFM- D:*** d= 0.29 • ***GMFM- E :*** d = 0.26 • ***PBS:*** d = 0.3 • ***10-MWT:*** d = 0.98 • ***2-MWT:*** d =0.98
Sharan et al., 2012 (Sharan et al., 2012)	**N**= 16 **Age:** EG (8.88 ± 3.23), CG (10.38 ±4.41) **Gender:** both	Post-operative CP	Not specified	**Therapy:** VR + CPT **Device:** Nintendo Wii **Games:** Wii sports & Wii fit	TT + CPT	3 alternate s/w, 3 wks.	PBS	**PBS:** sig. ↑ in both groups
Sajan et al., 2016 (Sajan et al., 2017)	**N**= 18 **Age:** 5–20 Y **Gender:** both	Spastic diplegic / Quadriplegic	I-IV	**Therapy:** VR+ multidisciplinary CT **Device:** Nintendo Wii	Multidisciplinary CT	45 min/s (VR) 36 h/w (CT) 6 s/w, 3 wks.	PBS, Walking distance and speed	Sig. ↑ in both groups in: ○ ***Walking:*** Speed and Endurance ○ ***PBS:*** d = -0.37