Table H-19. Strength of evidence for Key Question 2d, decreased risk of adverse outcomes of mobility devices: effect of physical activity interventions on spasticity

| **Intervention**  **Category,**  **Intervention** | **Comparator** | **Outcome** | **Number of Studies (Participants)**  **Author Year**  **(See Appendix B for Full Citation)** | **Study Limitations** | **Consistency** | **Precision** | **Reporting Bias** | **Strength of Evidence** | **Findings, Direction and Magnitude of Effect** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aerobic Exercise  (Treadmill, Aquatic) in CP | Usual care | Spasticity | 1 RCT (N=11)  1 Cohort (N=11)  Chrysagis, 2012  Lai, 2015 | Moderate | Inconsistent | Imprecise | Undetected | Insufficient | RCT: Mean change, p=value  Modified Ashworth Scale:  Knee extensors: 0.32 vs. 0.18, p=0.827  Knee flexors: 0.31 vs. 0.22, p=0.632  Foot plantar flexors: 0.32 vs. 0.17, p=0.460  Cohort:  A vs B (ANCOVA p-values)  Modified Ashworth Scale:  Ankle: 0.614  Knee: 1.000  Wrist: 1.000  Elbow: 1.000 |
| Aerobic Exercise  (Treadmill) in CP | RAGT vs Treadmill | Spasticity | 1 RCT (N=21)  Wu, 2017a (pilot study) | Moderate | Unknown | Imprecise | Undetected | Insufficient | Modified Ashworth Scale  (Baseline vs 6 weeks vs 8 weeks f/u)  0.62 (0.46) to 0.67 (0.60) to 0.41 (0.38), p=0.18, vs.  0.65 (0.36) to 0.48 (0.47) to 0.58 (0.44), p=0.19 |
| Aerobic Exercise in CP | Partial body-weight supported treadmill vs individualized strength training | Spasticity | 1 RCT (N= 26)  Johnston, 2011 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean difference between groups, p=between groups  KinCom computerized dynamometer:  Plantar Flexor Spasticity (J/O/s): -0.0003, p=0.75  Knee flexor spasticity (J/O/s): -0.0026, p=0.59 |
| *Aerobic Exercise in CP* | *Aquatic vs land-based exercise* | Spasticity | 1 RCT (N=32)  Adar, 2017 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Median pre-post p-values on MAS  Location Aquatics Land  RKneeFlexors 0.039 0.008  LKneeFlexors 0.003 0.003  RAnkleFlexors 0.005 0.001  LAnkleFlexors 0.046 0.046  RHipAdductors 0.025 0.083  LHipAdductors 0.003 0.013 |
| *Aerobic Exercise in MS* | *Neuromuscular electrical stimulation+ Strength exercises vs NMS alone* | Spasticity | 1 RCT (N=100)  Qi, 2018a | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean difference between groups:  Comprehensive Spasticity Scale (CSS): 1.6, 95% CI 0.33 to 2.87, p=0.01 |
| *Aerobic Exercise in MS* | *Lokomat-Pros (RAGT+VIRTUAL REALITY) VS Lokomat-Nanos (RAGT alone)* | Spasticity | 1 RCT (N=40)  Calabro, 2017 | Low | Unknown | Imprecise | Undetected | Insufficient | Effect size, p-value is between groups:  MAS: -0.01, 95% CI -0.539 to 0.539, p=0.40 |
| *Aerobic Exercise in MS* | *RAGT vs Conventional walking training* | Spasticity | 1 RCT (N=23)  Pompa, 2017 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean SD, p=between groups:  Spasticity VAS 100mm ranged from “no problem” to “very bad”:  5.05 to 3.40 vs. 5.31 to 5.23, p=0.048 |
| *Aerobic Exercise in MS* | *Aquatics vs. land-based relaxation exercises* | Spasticity | 1 RCT (N=73) | Low | Unknown | Imprecise | Undetected | Low for benefit | Spasm VAS: 5 (2.8) to 2 (4.3) vs. 6 (3.1) to 4 (4.5), 91% improvement vs. 10% improvement, p<0.05 |
| *Aerobic Exercise in SCI* | *Body weight support treadmill with FES vs Aerobic and resistance training* | Spasticity | 1 RCT (N=34)  Kapadia, 2014 | Moderate | Unknown | Imprecise | Undetected | Insufficient | MAS: No between group differences in MAS involving the hip, knee, and ankle joints.(data/results not reported) |
| *Aerobic Exercise in SCI* | *RAGT+rTMS vs RAGT+sham rTMS* | Spasticity | 1 RCT (N=31)  Kumru, 2016 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean Difference between groups:  MAS: -0.20, 95% CI -0.94 to 0.54, p=0.59 |
| *Strength Exercise (progressive resistance) in CP* | *Usual care* | Spasticity | 1 (N= 49)  Scholtes, 2010 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Effect Size: 0.46, 95% CI −0.34 to 1.26, p=0.26 |
| *Strength Exercise (progressive resistance) in MS* | *Attention control (social program)* | Spasticity | 1 (N= 71)  Dodd, 2011 | Low | Unknown | Imprecise | Undetected | Low for no clear benefit | Mean Difference between groups:  MSIS-88 stiffness: -2.4, 95% CI -0.52 to 0.5  MSIS-88 muscle spasms: -2.8, 95% CI -5.6 to 0.03 |
| *Balance Exercise*  *Hippotherapy in CP* | *Usual care (physical therapy)* | Spasticity | 1 (N=44 )  Lucena-Anton, 2018 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean (baseline to post-treatment), p=between groups  Modified Ashworth Scale:  Left Abductors: 2.77 to 2.50 vs. 2.59 to 2.54, p=0.040  Right Abductors: 2.22 to 1.77 vs. 2.40 to 2.31, p=0.047 |
| *Balance Exercise Hippotherapy in MS* | *Usual care (physical therapy)* | Spasticity | 1 (N= 70)  Vermohlen, 2018 | Moderate | Unknown | Imprecise | Undetected | Insufficient | Mean Difference between groups:  Spasticity NRS: −0.9 (95% CI −1.9 to −0.1), p=0.031 |

**Abbreviations:** CI = confidence interval; CSS = Comprehensive Spasticity Scale; MAS = Modified Ashworth Scale; NA = not applicable; NRS = Numeric Rating Scale; RAGT = Robot-Assisted Gait Training; SD = standard deviation; RCT = randomized controlled trial.