Promoting physical activity for disabled people who are ready to become physically active:

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Table 1 Study characteristics of the included studies

Authors	Sample size (M/F)	Age (SD) [range]	Disability group(s)	Duration inter-vention	Design	Assessment tool	Theory/ Model	Intervention delivery mode	Outcome measures	Significant Results	Non-significant results
(Arbour-Nicitopoulos, Martin Ginis, & Latimer, 2009)	44 (30/14)	49.70 (12.71)	SCI	10 weeks	RCT	Questionnaire measuring: - intention - self-efficacy (coping, barrier) - PARA-SCI - frequency of action planning - coping planning	-	- Exercise equipment, - Written materials (action plans, PA pamphlet, guidelines and safety tips, log books) - Telephone counselling sessions (3 in total)	- Intention - Coping self-efficacy: General barriers self-efficacy, Facility barriers self-efficacy, Scheduling self-efficacy. - Short version of the PARA-SCI over 7 days. - Frequency of action planning - Coping planning	- LTPA (exp vs con): d=0.71; p<0.03 - Intention (over time): d=0.18; p<0.03 - General barriers self-efficacy (over time): d=0.60; p<0.01 - Coping self-efficacy: Facility barriers (exp vs con): d=-0.65; p<0.04 General barriers (exp vs con): d=0.83; p<0.01 Scheduling (exp vs con): d=0.87; p<0.01 - Scheduling in week 1 predicting LTPA in week 5: β=0.31; p<0.03	- LTPA: Time effect was not significant, nor was the time x condition interaction (ps >0.60). - Intentions: No significant main effect for condition or time x condition interaction (ps <0.10).
(Arbour-Nicitopoulos, Tomasone, Latimer-Cheung, & Martin Ginis, 2014)	65 (37/27)	50.42 (12.78)	SCI	6 months	Cohort	Self-report LTPA Questionnaire for People with SCI	HAPA	Telephone counselling sessions (14 in total)	- Intention - Self-report LTPA Questionnaire for People with SCI for 7 days	- Intentions for regular LTPA at start and after 6 months remained high: ds=0.02-0.20; p = 0.44	- Increase in clients being regularly active at baseline (35%) versus 4 months (48%; p = 0.13) and 6 months (52%, p = 0.09)

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(Cardinal, Kosma, & McCubbin, 2004)	322(122/200)	52.5 (13.9)	AMP, CP, joint and connective tissue disease, MS, MD, PP, SB, SCI, CVA, unspecified	-	Cross-sectional	Questionnaire measuring: - Stage of change - Process of change (behaviour and cognitive) - Decision balance - Exercise barriers)	TTM	-	- Stages of change - Behavioural processes of change - Cognitive processes of change - Self-efficacy - Decision balance: Pros for exercise Cons for exercise - Exercise barriers	- Behavioural processes of change: d= 1.63; p<0.001 - Self-efficacy: d=1.31; p<0.001 - Pros for exercise: d=0.97; p<0.001 - Cons for exercise: 0.87; p<0.001 - Cognitive processes of change: d=0.87; p<0.001 - Exercise barriers: d=0.84; p<0.001 Predicting stages of change: - Maintenance (91.3%) - Precontemplation (73.8%) - Contemplation (48.3%) - Preparation (23.8%) - Action (5.3%)	
(Gernigon, Pereira Dias, Riou, Briki, & Ninot, 2015)	18(13/5)	36.0 (16.1)	SCI	16 weeks	Cross-Sectional	- Approach and Avoidance Questionnaire for Sport and Physical Education - Physical Self-Perception Profile	-	-	- Approach and Avoidance Questionnaire for Sport and Physical Education - Physical Self-Perception Profile	Participants vs non-participants: - Mastery avoidance goals: d=1.06; p<0.05 - Physical self-worth: d=1.53; p<0.01	- global self-esteem: d=1.06; p=0.07 Participants vs non-participants: No significant differences were found for mastery-approach goals, performance-approach goals, performance-avoidance goals, physical condition, physical strength, body attractiveness, and sport competence (p>0.05).

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(Jaarsma, Geertzen, de Jong, Dijkstra, & Dekker, 2014)	76 (30/46)	30.5 (9.7)	AMP, CP, SCI, VI, Les Autres, other Neuro	-	Cross-sectional	Self-constructed questionnaire on barriers and facilitators of sport	TPB, ICF	-	- Self-constructed questionnaire focusing on personal and environmental barriers and facilitators of sport	Wheelchair vs ambulant: - Experienced barriers: d= 0.53; p=0.023 - Lack of sports facilities: p<0.01 - Sports facilities not adjusted: p<0.01 - Health and physical fitness to maintain active: p=0.015 Initiate vs maintain: - Health and physical fitness: d=0.59; p=0.012 - Competition: d=0.62; p=0.009	Wheelchair vs ambulant: - Dependency on others: p=0.055 - transport: p=0.055
(Jaarsma, Dekker, Koopmans, Dijkstra, & Geertzen, 2014)	648 (311/337)	49.1 (18)	VI	-	Cross-sectional	Self-constructed questionnaire on barriers and facilitators of sport	ICF	-	- Self-constructed questionnaire focusing on personal and environmental barriers and facilitators of sport	- Higher education: d=0.24; p=0.039 Disability (experienced as barrier): d=-0.31; p=0.03 - Costs: d=-0.73; p<0.001 - Lack of peers/buddies: d=-1.05; p<0.001 - Use of computer software: d=0.35; p=0.003	- Using a white cane: d=0.029;p=0.801 - Having a guide dog: d=0.23; p=0.170 - Age: d=0.0027; p=0.368 - Gender: d=0.10; 0.361

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(Keegan, Chan, Ditchman, & Chiu, 2012)	126 (83/43)	43.5 (13.3) [19-76]	SCI	-	Cross-sectional	- Self-Report Functional Independence Measure basic Activities of Daily Living subscale. - TPB physical activity and exercise questionnaire - Friend Support for Exercise Habits Scale/ Family Support for Exercise Habits Scale - Outcome Expectations for Exercise Scale - Barriers to Health Promoting Activities for Disabled Persons Scale - SCI Exercise Self-Efficacy Scale - Revised Planning for Exercise Scale - International Physical Activity Questionnaire - Physical Activity Stages of Change Instrument	Pender's Health promotion model (SCT & TPB)	-	- Pre-injury physical activity - Self-Report Functional Independence Measure - Normative and control beliefs about physical activity and exercise scale. - Friend Support for Exercise Habits Scale/ Family Support for Exercise Habits Scale - Outcome Expectations for Exercise Scale - Barriers to Health Promoting Activities for Disabled Persons Scale - SCI Exercise Self-Efficacy Scale - Revised Planning for Exercise Scale - International Physical Activity Questionnaire - Physical Activity Stages of Change Instrument	- Physical activity/exercise participation: Pre-injury PA: β=0.17; p<0.05 Severity of SCI: β=0.20; p<0.05 Commitment to action plan: β=0.41; p<0.01 - Commitment to action plan: Friend/family support: β=0.40; p<0.01 Perceived benefits: β=0.17; p<0.05 Perceived self-efficacy: β=0.35; p<0.05	-

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(Kennedy, Taylor, & Hindson, 2006)	35 (30/5)	31.91 (10.60) [18-61]	SCI	6 weeks	Cohort	- Life Satisfaction Questionnaire - Hospital Anxiety and Depression Scale - Perceived Manageability - Generalised Self-Efficacy Scale - Overall gains (via interviews)	-	Course with multiple or single activity program (1 week)	- Life Satisfaction questionnaire - Hospital Anxiety and Depression Scale - Needs Assessment Checklist - Generalised Self-Efficacy Scale - Overall gains of intervention: 1) Why would you recommend Back-Up to other people with SCI? 2) Describe how being involved in Back-Up has had a positive effect on your rehabilitation. 3) What do you feel you have gained from Back-Up?	- Life Satisfaction General: d=0.88; p=0.016 - Leisure Satisfaction: d=1.021; p=0.007 - Anxiety: d=0.50; p<0.01 - GSES: d=0.93; p=0.012	*Quantitative results:* - Perceived Manageability d=0.88 *Qualitative results:* - Overall gains of intervention: 1) 'Meeting people and making friends.' 'Perception of possibilities and capabilities.' 2) 'Self-confidence and sense of achievement.' 'Skills and knowledge' 3) 'Self-confidence and sense of achievement.' 'Meeting people and making friends.'
(Kosma, Cardinal, & McCubbin, 2004)	151 (34/117)	37.9 (8.8)	SCI, CP, MS	-	Cross-sectional	Questionnaire measuring: - Stage of change - Process of change - Self-efficacy - Decision balance	TTM	-	- Stages of change - Self-efficacy - Decision balance	Most important stages of change predictors: - Function 1: Behavioural changes: r= 0.94 Cognitive changes: r=0.71 Self-efficacy: r= 0.57 Decision balance: r=0.36 - Function 2: Cognitive processes of change: r=0.58	-

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(Latimer, Martin Ginis, & Arbour, 2006)	54 (26/28)	40.61 (10.89)	SCI	8 weeks	RCT	Questionnaire measuring: - intention - PARA-SCI - Perception of control	TPB	- Exercise equipment - Written materials (action plans, PA pamphlet, guidelines and safety tips, log books)	- Intention - Physical Activity Recall Assessment for Individuals with SCI - PBC - Scheduling self-efficacy - Barrier self-efficacy	- Minutes PA (exp vs con): d=0.52, p=0.04 - Intention as predictor for PA duration (only exp): β=0.68, p=0.05 - Intention as predictor for PA frequency (only exp): β=0.76, p=0.05 -Treatment effect on intention: d=0.73, p=0.04 - Treatment effect on scheduling self-efficacy: d=0.71, p=0.04	- Number of days participants engaged in ≥30 min of physical activity. - Intention was no predictor for PA duration and frequency *p*s > 0.84 -PBC not significant for experimental and control group. - No significant treatment effects for the PBC or barrier self-efficacy measures (*p*s > 0.05).
(Latimer, Martin Ginis, & Craven, 2004)	124 (86/38)	43.45* (16.21) *	SCI	-	Cross-sectional	Questionnaire measuring TPB constructs (attitude, subjective norm, PBC) - Godin Leisure Time Exercise Questionnaire	TPB	-	- Self-constructed questionnaire assessing TPB construct: Attitude Subjective norm PBC Intentions - Godin Leisure Time Exercise Questionnaire	- PBC as predictor of intention (only for TP): β=0.59, p<0.01 - PBC predictor of exercise in moderate intensity exercise model (only for TP): β=0.33, p=0.03	- For individuals with paraplegia, none of the TPB constructs predicted intentions. - For TP intentions were not a significant predictor of exercise behaviour at any intensity. - For individuals with paraplegia, the TPB constructs did not predict exercise behaviour at any intensity.

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(Martin Ginis et al., 2013)	238 (179/57, 2 missing)	44.14 (12.74)	SCI	-	Cross-sectional	PARA-SCI, Questionnaire measuring LTPA outcome expectancies, self- efficacy (task, maintenance, recovery, scheduling, goal setting), intentions, planning and action control	TPB, HAPA	-	Motivational phase constructs: - LTPA Outcome Expectancies - Task self-efficacy - Intentions Volitional phase constructs: - Planning - Maintenance Recovery, Scheduling, Goal Setting self-efficacy - Action Control	- Actors reported more min/day of moderate and heavy intensity LTPA than intenders and non-intenders, ps < 0.001. - Actors scored significantly higher than both intenders and non-intenders on all constructs, ps ≤ 0.01. - Intenders scored significantly higher than non-intenders on all constructs, ps ≤ 0.01.	Intenders and non-intenders did not differ on min/day of moderate and heavy intensity LTPA.

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(Molton, Jensen, Nielson, Cardenas, & Ehde, 2008)	130 (93/37)	45 (14.4) [18-82]	SCI	-	Cross-sectional	- Numerical Rating Scale for pain intensity - Multi-dimensional Pain Readiness to Change Questionnaire - Motivational Model of Pain Self-Management	Motivational Model of Pain Self-Management	-	- Numerical Rating Scale - Multidimensional Pain Readiness to Change Questionnaire - Motivational Model of Pain Self-Management	- Effect Perceived importance on exercise behaviour: β= 0.48, p<0.001 - Effect Perceived importance on Readiness to exercise: β= 0.56, p<0.001 - Readiness to exercise on exercise behaviour: β= 0.54, p<0.001 - Self-efficacy on exercise behaviour: β= 0.41, p<0.001 - Self-efficacy on readiness to exercise: β= 0.56, p<0.001 - Readiness to exercise on exercise behaviour: β= 0.23, p=0.01	- Effect of perceived importance on exercise behaviour (including readiness to exercise) β= 0.18, p=0.04 (after α correction)

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(Pelletier, Latimer-Cheung, Warburton, & Hicks, 2014)	17 (13/4)	42.1 (10.6)	SCI	16 weeks	Cohort	- Exercise beliefs questionnaire	SCT	Telephone counselling sessions (5 in total)	- (Self-reported) Adherence to twice-weekly exercise program for 16-week period - Exercise belief questionnaire	-	- No difference in attendance rates between inpatient compared to outpatient counselling groups. - Effect size: Inpatient compared to outpatient counselling groups: d=0.63, p=0.22 Outpatient referral only compared to referral plus counselling: d=0.79, p=0.22. - Exercise belief questionnaire: No significant differences in constructs between groups. p>0.05. No significant correlation between adherence and constructs. p=0.21

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(Perrier, Sweet, Strachan, & Latimer-Cheung, 2012)	201 (119/82)	44.0 (12.8)	SCI, AMP, other (stroke, polio)	2 weeks	Pre-post testing	Questionnaire measuring: - Athletic identity (AIMS) - Outcome expectancies - Risk perceptions - Self-efficacy - Intentions - Planning	HAPA	-	- Athletic Identity Measurement Scale - Instrumental expectancies - Affective expectancies - Negative expectancies - Health risk perceptions - Task self-efficacy - Intentions - Scheduling self-efficacy - Barrier self-efficacy - Action planning - Coping planning - Recovery self-efficacy - modified version of the 7 day short form Leisure Time Physical Activity Questionnaire for People with Spinal Cord Injury	- Negative outcome expectancies negatively predicts intention on sport participation: β=-0.24, p=0.001 - Higher task self-efficacy, decrease in planning: β=0.22, p=0.015 - Indirect effect task self-efficacy on planning through intention: β=0.13, p=0.002 - Maintenance self-efficacy on sport participation: β=0.48, p=0.003 - Indirect effect planning on sport participation through self-efficacy: β=0.33, p=0.002	- Health risks did not predict intentions to participate in sport: β=-0.09, p=0.17 - Relationship between planning and sport participation: β=0.052, p=0.65 - recovery self-efficacy and sport: β=0.19, p=0.11

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(Perrier, Shirazipour, & Latimer-Cheung, 2015)	201 (119/82)	44.27 (12.08)	Acquired physical disabilities, such as SCI	-	Cross-sectional	Questionnaire measuring: - Intention - Outcome expectancies - Risk perceptions - Self efficacy - Planning	HAPA	-	- Staging sport - Outcome expectancies - Risk perceptions - Task self-efficacy - Intentions - Maintenance self-efficacy - Planning - Recovery self-efficacy	Task self-efficacy, p<0.001: d(NI, IN)= 0.25 d(NI,A)=1.34 d(IN,A)=1.15 Intentions, p<0.001: d(NI, IN)=0.57 d(NI,A)=2.29 d(IN,A)=1.32 Scheduling self-efficacy, p<0.001: d(NI, IN)= 0.51 d(NI,A)=1.49 d(IN,A)=0.76 Affective outcome expectancies, p<0.001: d(NI, IN)= 1.10 d(NI,A)=1.20 d(IN,A)=0.0080 Recovery self-efficacy, p<0.001: d(NI, IN)= 0.76 d(NI,A)=1.46 d(IN,A)=0.17 Barrier self-efficacy, p<0.001: d(NI, IN)= 0.95 d(NI,A)=1.58 d(IN,A)=0.78 Action plans, p<0.001: d(NI, IN)= 0.92 d(NI,A)=2.56 d(IN,A)=1.06	Bonferroni-adjusted α = 0.006: - Instrumental outcome expectancies, p=0.13: d(NI, IN)= 0.43 d(NI,A)=0.46 d(IN,A)=0.0061 - Negative outcome expectancies, p=0.006: d(NI, IN)= 0.15 d(NI,A)=0.44 d(IN,A)=0.25 - Risk perceptions, p=0.21: d(NI, IN)= 0.18 d(NI,A)=0.42 d(IN,A)=0.68 - Coping plans, p=0.028 d(NI, IN)= 0.28 d(NI,A)=0.71 d(IN,A)=0.38

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(Saebu & Sorensen, 2011)	327 (149/178)	24.15 (3.88)	CP, SB, SCI, MD, VI	-	Cross-sectional	- International Physical Activity Questionnaire - Functioning and Disability - Barriers to exercise (environmental factors) - Exercise Self-Regulation Questionnaire	SDT, ICF	-	- International Physical Activity Questionnaire (Short Form) - Self construction questionnaire about function and disability - Self constructed questionnaire about environmental factors - Exercise Self-Regulation Questionnaire - Exercise self-schema - Medical Outcome Study Short Form 12	- Acquired disability β=0.12, p<0.05 - Low need for personal activity equipment β=0.15,p<0.01 - Employed β=0.16 - Available local activities β=0.11, p<0.05 - High physical component summary (PCS) β=0.12,p<0.05 - Exerciser schematics β=0.27, p<0.01 - High intrinsic motivation β=0.14, p<0.01	- No need for personal aids - High education - Need for more than 3 hours of daily personal care - Functional personal activity equipment - Adapted facilities at site - High level of information of activities - Age - Gender

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(Sweet, Martin Ginis, & Latimer-Cheung, 2012)	541 (411/130)	47.6 (13.4)	SCI	18 months	Observa-tional study	- TPB to predict LTPA in persons with SCI - PARA-SCI	TPB	-	- Theory of Planned Behaviour Measures - Physical Activity Recall Assessment for People with SCI	Significant results compared to inactive group: - Intention: Increaser: d=0.16, p=0.02 Decreaser: d= 0.29, p<0.01 Stable active: d=0.43, p<0.01 - Less severe injuries: Decreaser: d=0.27, p=0.01 Stable active: d=0.20, p=0.05 - Stable active Younger: d=0.016, p=0.05 - Fewer years post injury: d=0.03, p<0.01	Non-significant results (p>0.05) compared to inactive group: - Age: Increaser, Decreaser - Gender: Increaser, Decreaser, Stable active - Years post injury: Increaser, Decreaser - Injury severity: Increaser - Subjective norms: Increaser, Decreaser, Stable active - Attitude: Increaser, Decreaser, Stable active - PBC: Increaser, Decreaser, Stable active
(Thomas et al., 2011)**	21(10/11)	43.6 (14.2)	SCI	9 months	RCT	- TTM questionnaire - Borg Rating of Perceived Exertion scale for physical activity intensity	TTM	- Telephone counselling sessions (7 in total), - Written materials (brochures, tailored exercise instructions), - Exercise materials (dvd)	- Stages of Change (TTM) - Self-reported activity log (number of days, total minutes per day, types of activity, and intensity of each activity for one full week per month for each of the 3 months) - Borg Rating of Perceived Exertion scale for physical activity intensity	- CON: PA increase at T2, T3 and T4 compared to T1 (p<0.05, p<0.01, p<0.05 respectively). - EXP: PA increase T3 and T4 compared to T1 (p<0.05 for both).	- EXP: no increase in PA at T2 compared to T1 (p>0.05). - No significant differences in improvement between groups

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(Warms, Belza, Whitney, Mitchell, & Stiens, 2004)	16 (13/3)	43.2 (11.3) [24-68]	SCI	6 weeks	Cohort	- Stage of Readiness for Change in Exercise Behaviour - Barriers to Health Activity Among Disabled Persons - Self-rated Abilities for Health Practices Scale - Self-rated Health Scale	-	- Face to face counselling (motivational interviewing, goal setting, action plan), - Telephone counselling sessions (4 in total), - Written materials (pamphlets, tailored physical activity information)	- Accelerometer and a physical activity record for 4 days. - Stages of change (Trans Theoretical Model) - Barriers to Health Activity Among Disabled Persons Scale. - Self-rated Abilities for Health Practices Scale. - Self-rated Health Scale. - CES-D - Isometric strength of elbow and shoulder flexors/extensors was measured bilaterally using a handheld dynamometer	- Motivational barriers: d=1.5, p=0.01 - Exercise self-efficacy: d=-1.1, p=0.05 - Self-rated Health: d=-1.1, p=0.04 - Muscle Strength: d=-3.6, p<0.001	- Activity score: d=-0.68, p = 0.32 - Total barriers score: d=1.1, p=0.06 - external barriers: d= 0.50, p=0.37 - self-rated abilities for health practices: d=-0.45, p=0.39 - Depression: d=0.64, p=0.24

* Pooled mean and standard deviation

** Effect sizes could not be calculated based on the results provided in the study.

A = Actors, AMP = Amputation, CES-D = Centre for Epidemiologic Studies Depression Scale, CON = control group, CP = Cerebral Palsy, CVA = Cerebral Vascular Accident (which includes both stroke and traumatic brain injury), EXP = Experimental group, F = Female, HAPA = Health Action Process Approach, I = Interview, ICF = International Model of Classification, Functioning and Disability, IN = Intenders, LTPA = Leisure Time Physical Activity, M = Male, MD = Muscular Disease, MS = Multiple Sclerosis, NI = Non-Intenders, PA = Physical Activity, PARA-SCI = Physical Activity Recall Assessment for People with Spinal Cord Injuries, PBC = Perceived Behavioural Control, PP = Post-Polio, Q = Questionnaire, RCT = Randomised Controlled Trial, SB = Spina Bifida, SCI = Spinal Cord Injury, SCT = Social Cognitive Theory, SD = Standard Deviation, SDT = Self-Determination Theory, SOC = Stages of Change, TP = Tetraplegia, TPB = Theory of Planned Behaviour, TTM = Trans Theoretical Model, VI = Visual Impairment