Table 1. Characteristics of included studies

Outcome	Study	Country	Setting	Study design	Participants	Findings [effect size]	PA/E group	Non PA/E group	Assessment Time Point	ITT
Anxiety Symptoms	Carei 2010(1)	USA	Community	RCT 2 groups	Adolescents diagnosed with eating disorders (n=53) (M age=16.5yrs)	Yoga and WL decreased anxiety (PP) [trait 0.38b; state 0.2b]	Yoga (n=26)	WL (n=27)	PP, FU (4wks)	No*
	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5yrs)	No effect [RE-weight training 0.52; AE-cycling 0.54] a	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	NS
	Parker 2016(4)	Australia	Community	2x2 Factorial RCT 4 groups	Young people with mild-moderate anxiety and/or depression (n=176) (M age=17.6yrs)	No effect [nr]	PA + PST (n=44); PA + SC (n=45)	PsyEd + PST (n=43); PsyEd + SC (n=44)	PP	Yes
	Woolery, 2004(5)	USA	Community	RCT 2 groups	Volunteers with mild levels of depression BDI score between 10-15 (n=28) M age=21.5)	Yoga reduced anxiety (BG) [NR]	Yoga (n=13)	WC (n=15)	PP	NS

	Yang 2015(6)	China	Community	RCT 2 groups	University students diagnosed with anxiety disorder (n=38) (M age=21.8yrs)	PA-CRT+ Counselling reduced anxiety (BG) [nr]	PA-CRT+Counselling (n=19)	Counselling (n=19)	PP, FU (3mths)	Yes
Cognition	Ventura 2013(7)	USA	Community	CT 2 groups (randomisation NS)	Individuals with first-episode schizophrenia (n=15) (M age=21yrs)	CTr+E improved cognitive functioning (BG) [0.43]	CTr+E (n=ns)	TAU (n=ns)	PP	NS
Depression Symptoms	Balchin 2016(8)	South Africa	University	RCT 3 groups	Moderately depressed male university students & staff (n=30) (M age=25.4yrs)	AE-high & AE-mod decreased depression (PP; not BG) [nr]	AE-high (n=9); AE-mod (n=11); AE-low (n=10)	None	PP	Thesis reports 33 randomised, paper reports 30 randomised
	Brown 1992(9)	USA	Psychiatric facility	RCT 2 groups	Adolescents with dysthymia & conduct disorder (n=27) (M age=15.6yrs)	AE-Running decreased depression for girls at 4 weeks (BG) [nr]	AE-running (n=17); Standard PE (n=10)	None	PP, FU (4wks)	No
	Carei 2010(1)	USA	Community	RCT 2 groups	Adolescents diagnosed with eating disorders (n=53) (M age=16.5yrs)	Yoga and WL decreased depression (PP) [0.26b]	Yoga (n=26)	WL (n=27)	PP, FU (4wks)	No*

	Carter 2015(10)	UK	Community	Pragmatic RCT 2 groups	Adolescents scoring >14 on the CDI-2 (n=87) (M age=15.4yrs)	CE-Circuit-training decreased depression at 6mo FU (BG) [nr]	TAU + CE-circuit training (n=44)	TAU (n=43)	PP, FU (6mths)	Yes
	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5)	No effect [RE-weight training 0.52; AE-cycling 0.04a]	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	NS
	Hughes 2013(11)	USA	Community	RCT 2 groups	Adolescents with a DSM-IV diagnosis of MDD (n=30) (M age=17yrs)	No difference at post intervention (BG) [nr]. AE and stretching decreased depressive symptoms (PP) [0.36b], AE decreased symptoms more rapidly [0.21b]	AE (n=16); Stretching* (n=14)	None	PP, FU (6, 12mths)	No
	Noorbakhsh, 2013(12)	Iran	University	RCT 3 groups	Female university students with mild-to-moderate depressive symptoms BDI (n=75) (M age=18.8yrs)	AE decreased depression (BG - PE) [nr] No difference between swimming and PE; swimming and AE.	AE (n=25); Swimming (n=25)	PE (n=25)	PP	NS
	Olson, 2017(13)	USA	Comunity	RCT 2 groups	Young people with confirmed MDD diagnosis (n=50) (M age=21.1yrs)	AE decreased depression (BG) [0.14b]	AE (n=25)	Stretching (n=25)	PP	No
	Parker 2016(4)	Australia	Community	2x2 Factorial RCT 4 groups	Young people with mild-moderate anxiety and/or depression (n=176) (M age=17.6yrs)	PA decreased depression (BG) [BDI-II =0.41, MADRS= 0.48]	PA + PST (n=44); PA + SC (n=45)	PsyEd + PST (n=43); PsyEd + SC (n=44)	PP	Yes

	Roshan 2011(14)	Iran	Secondary school	RCT 2 groups	Female adolescents scoring ≥18 on the HAM-D (n=24) (M age=16.9yrs)	AE-Pool walking decreased depression (BG) [nr]	AE-pool walking (n=12)	No intervention (n=12)	PP	NS
	Sadeghi, 2016(15)	Iran	University	RCT 3 groups	University students with a depression diagnosis and BDI-II score between 13-28 (n=46) (M age=21yrs)	AE and CBT reduced depression (BG) [nr]	AE (n=16)	Group discussion (n=14); CBT (n=16)	PP	NS
	Wooley, 2004(5)	USA	Community	RCT 2 groups	Volunteers with mild levels of depression BDI score between 10-15 (n=28) M age=21.5)	Yoga reduced depression (BG) [nr]	Yoga (n=13)	WC (n=15)	PP	NS
	Wunram, 2018(16)	Germany	Psychiatric facility	Partly RCT 3 groups	Adolescent inpatients or day-clinic patients diagnosed with non-psychotic major depressive disorder and a DIKJ score >17 raw points (n=64) (M age=15.9 years)	AE – cycling ergometer reduced depression (BG AE – cycling ergometer – TAU control [endpoint =0.45, 26 weeks = 0.85]) No difference between AE – cycling ergometer and vibration plate at any time point.	AE – cycling ergometer + TAU (n=20)	Vibartion plate + TAU (n=21)	PP, FU (14wks & 26 weeks)	No*
	Yavari, 2008(17)	Iran	University	RCT 2 groups	Male university students with BDI score >19 (n=74) (Age range=19-22)	AE – swimming reduced depression (BG) [nr]	AE – swimming (n=37)	No intervention (n=37)	PP	NS
Dysfunctional Attitudes	Sadeghi, 2016(15)	Iran	University	RCT 3 groups	University students with a depression diagnosis and BDI-II score between 13-28 (n=46) (M age=21yrs)	CBT reduced dysfunctional attitudes (BG) [nr]	AE (n=16)	Group discussion (n=14); CBT (n=16)	PP	NS

Eating Disorder Symptoms	Carei 2010(1)	USA	Community	RCT 2 groups	Adolescents diagnosed with eating disorders (n=53) (M age=16.5yrs)	Yoga decreased eating disorder symptoms (BG at 9-12 wks); Yoga decreased food preoccupation (PP) [0.16b]	Yoga (n=26)	WL (n=27)	PP, FU (4wks)	No*
	Sundgot-Borgen 2002(18)	Norway	Community	RCT 4 groups	Adolescents with a DSM-IV diagnosis of BN (n=64) (M age=22.5yrs)	AE, CBT and Nutritional advice decreased bulimia, CBT and Nutritional advice decreased drive for thinness, AE and CBT decreased body dissatisfaction (PP). CBT decreased body dissatisfaction at PI and FU and bulimia and vomiting at FU (BG). AE reduced laxative use at PI and FU and drive for thinness, bulimic symptoms at FU (BG). AE and CBT reduced binges (PP). AE reduced binges compared to CBT at FU (BG). CBT reduced vomiting (PP) and at FU (BG). AE reduced laxative use (BG) [nr]	AE (n=15)	WL (n=16) CBT (n=16); Nutritional advice (n=17);	PP, FU (6, 18mths)	NS
Functioning	Curtis 2016(19)	Australia	Community	non-randomised CT 2 groups *	People diagnosed with first-episode psychosis (n=28) (M age=20.7yrs)	CE + health coaching + dietetic support + TAU improved health & social functioning (PP); CE + health coaching + dietetic support + TAU improved social occupational & psychological functioning (PP) [nr]	CE + health coaching + dietetic support + TAU (n=16)	TAU (n=12)	PP	Yes
	Hughes 2013(11)	USA	Community	RCT 2 groups	Adolescents with a DSM-IV diagnosis of MDD (n=30) (M age=17yrs)	No difference at post intervention (BG). AE and stretching improved psychosocial functioning. [0.88b]. AE resulted in greater improvements in Family Global Assessment of Function (PP) [0.61b].	AE (n=16); Stretching* (n=14)	None	PP, FU (6, 12mths)	No
	Loh 2015(20)	Malaysia	Psychiatric facility	RCT 2 groups	Inpatients with a DSM-IV diagnosis of schizophrenia (n=104) (M age=21.6)	Walking improved personal and social performance (PP) no BG analysis presented]) [nr]	Walking (n=52)	TAU (n=52)	PP	Yes

	Parker 2016(4)	Australia	Community	2x2 Factorial RCT 4 groups	Young people with mild-moderate anxiety and/or depression (n=176) (M age=17.6yrs)	No effect [nr]	PA + PST (n=44); PA + SC (n=45)	PsyEd + PST (n=43); PsyEd + SC (n=44)	PP	Yes
	Ventura 2013(7)	USA	Community	CT 2 groups (randomisation NS)	Individuals with first-episode schizophrenia (n=15) (M age=21yrs)	CTr+E improved school or work functioning [0.73], in independent living skills [1.26] and in family relationships [0.93] (BG)	CTr+E (n=ns)	TAU (n=ns)	PP	NS
Irritability	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5)	RE-weight training reduced irritability (BG) [Frequency - RE-weight training 1.18; AE-cycling 0.88; Intensity - RE-weight training 1.23; AE-cycling 0.74]a	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	NS
Mood States	Hughes 2013(11)	USA	Community	RCT 2 groups	Adolescents with a DSM-IV diagnosis of MDD (n=30) (M age=17yrs)	No difference at post intervention (BG). AE and stretching improved mood states (anger [0.26b], fatigue [0.47b] and tension [0.71b] (PP)	AE (n=16); Stretching* (n=14)	None	PP, FU (6, 12mths)	No
	Brown 1992(9)	USA	Psychiatric facility	RCT 2 groups	Adolescents with dysthymia & conduct disorder (n=27) (M age=15.6yrs)	AE-Running improved mood states in girls (anxiety, hostility, confused thinking, and fatigue) (BG). AE-Running improved vigour (BG) [nr]	AE-running (n=17); Standard PE (n=10)	None	PP, FU (4wks)	No
	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5)	RE-weight training reduced anxiety-tension (BG, wk 6) [RE-weight training 1.05; AE-cycling 0.73]a	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	NS

Distress	Jeong 2005(21)	Korea	Middle school	RCT 2 groups	Female adolescents with mild depression (n=40) (M age=16.0yrs)	Dance improved psychological symptoms & distress (BG) [nr]	Dance (n=20)	No intervention (n=20)	PP	NS
Negative Thoughts	Sadeghi, 2016(15)	Iran	University	RCT 3 groups	University students with a depression diagnosis and BDI-II score between 13-28 (n=46) (M age=21yrs)	CBT reduced belief in negative thoughts (BG)[nr]	AE (n=16)	Group discussion (n=14) CBT (n=16);	PP	NS
Psychosis symptoms	Loh 2015(20)	Malaysia	Psychiatric facility	RCT 2 groups	Inpatients with a DSM-IV diagnosis of schizophrenia (n=104) (M age=21.6)	Walking improved psychosis symptoms (positive, negative symptoms and general psychopathology) (PP [no BG analysis presented]) [nr]	Walking (n=52)	TAU (n=52)	PP	Yes
Quality of Life	Carter 2015(10)	UK	Community	Pragmatic RCT 2 groups	Adolescents scoring >14 on the CDI-2 (n=87) (M age=15.4yrs)	No effect [nr]	TAU + CE-circuit training (n=44)	TAU (n=43)	PP, FU (6mths)	Yes
	DelValle 2010(22)	Spain	Community	RCT 2 groups	Outpatients diagnosed with restrictive anorexia nervosa (n=22) (M age=14.5yrs)	No effect [nr]	RE-weight training (n=11)	No intervention (n=11)	PP	NS
	Loh 2015(20)	Malaysia	Psychiatric facility	RCT 2 groups	Inpatients with a DSM-IV diagnosis of schizophrenia (n=104) (M age=21.6)	Walking improved QOL (physical functioning, physical role limitations, social functioning) (PP [no BG analysis presented]) [nr]	Walking (n=52)	TAU (n=52)	PP	Yes

Remission (Anxiety)	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5)	RE increased remission rate (BG) [nr]	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	Yes
	Yang 2015(6)	China	Community	RCT 2 groups	University students diagnosed with anxiety disorder (n=38) (M age=21.8yrs)	CRT+ Counselling reduces anxiety recurrence compared to counselling (BG) [nr]	PA-CRT+Counselling (n=19)	Counselling (n=19)	PP, FU (3mths)	Yes
Remission (Depression)	Hughes 2013(11)	USA	Community	RCT 2 groups	Adolescents with a DSM-IV diagnosis of MDD (n=30) (M age=17yrs)	100% at FU for AE; 70% at FU for stretching	AE (n=16); Stretching* (n=14)	None	PP, FU (6, 12mths)	No
	Wunram	Germany	Psychiatric facility	Partly RCT 3 groups	Adolescent inpatients or day-clinic patients diagnosed with non-psychotic major depressive disorder and a DIKJ score >17 raw points (n=64) (M age=15.9 years)	No between group differences in remission rates at any time point	AE – cycling ergometer + TAU (n=20)	Vibration plate + TAU (n=21)	PP, FU (14wks & 26 weeks)	No*
Self-Efficacy	Brown 1992(9)	USA	Psychiatric facility	RCT 2 groups	Adolescents with dysthymia & conduct disorder (n=27) (M age=15.6yrs)	AE-Running improved self-efficacy (BG) [nr]	AE-running (n=17); Standard PE (n=10)	None	PP, FU (4wks)	No
Self-Esteem	Curtis 2016(19)	Australia	Community	non-randomised CT 2 groups *	People diagnosed with first-episode psychosis (n=28) (M age=20.7yrs)	No effect [nr]	CE + health coaching + dietetic support + TAU (n=16)	TAU (n=12)	PP	Yes

Sleep Quality	Curtis 2016(19)	Australia	Community	non-randomised CT 2 groups *	People diagnosed with first-episode psychosis (n=28) (M age=20.7yrs)	CE + health coaching + dietetic support + TAU improved sleep quality (PP) [nr]	CE + health coaching + dietetic support + TAU (n=16)	TAU (n=12)	PP	Yes
Social Adjustment	Hughes 2013(11)	USA	Community	RCT 2 groups	Adolescents with a DSM-IV diagnosis of MDD (n=30) (M age=17yrs)	No difference at post intervention (BG). AE and stretching improved social adjustment (except dating) (PP) [school =0.16b; friends = 0.19b; family =0.21b, anxiety = 0.43b]	AE (n=16); Stretching* (n=14)	None	PP, FU (6, 12mths)	No
Substance Use	Parker 2016(4)	Australia	Community	2x2 Factorial RCT 4 groups	Young people with mild-moderate anxiety and/or depression (n=176) (M age=17.6yrs)	No effect [nr]	PA + PST (n=44); PA + SC (n=45)	PsyEd + PST (n=43); PsyEd + SC (n=44)	PP	Yes
Worry	Herring 2011, 2011a(2, 3)	USA	Community	RCT 3 groups	Women with a DSM-IV diagnosis of GAD (n=30) (M age=23.5)	Combined RE-weight training and AE-cycling conditions decreased worry (BG). No BG difference for intervention groups alone [RE-weight training 0.45, AE-cycling 0.45] a	RE-weight training (n=10); AE-cycling (n=10)	WL (n=10)	PP	Yes

[a] = Hedges' d; AE=Aerobic Exercise; [b] = partial η^2 BDI-II=Beck Depression Inventory-II; BN=Bulimia Nervosa; BG=Between Group Effects; CBT=Cognitive Behavioural Therapy; CBD: Cannot be Determined; CDI-(2)=Children's Depression Inventory-(2); CE=combined aerobic + resistance; CRT=Collective Rehabilitation Training; CT=Controlled trial; CTr=Cognitive Training; DSM-IV=Diagnostic and Statistical Manual of Mental Disorders 4th Edition; E=Exercise; FU=Follow Up; GAD= Generalised Anxiety Disorder; HAM-D= Hamilton Rating Scale of Depression; ITT=Intention to Treat Analysis; Min=Minutes; Mod=Moderate; n=sample size; NA=Not Applicable; NC=Nutritional Counselling; NS= Not stated; M=Mean; MDD=Major Depression Disorder; Mo=Months; nr=not reported; PA=Physical Activity; PE=Physical Education; PP=Pre-Post Intervention; PST=Problem Solving Therapy; PsyEd=Psychological Education; RCT= Randomised Control Trail; RE=Resistance Exercise; SC=Supportive Counselling; TAU=Treatment as Usual; VIG=Vigorous; Wks=Weeks; WL=Wait list; Yrs=Years; Stretching* We generally have classified stretching as a non-PA/E comparison intervention, but in this particular study the HR achieved by the stretching group was consistent with moderate intensity exercise. Therefore, in this study only, we classified stretching as a moderate intensity; No* states ITT but all randomised not included in analysis; Non-randomised CT 2 groups* unclear if two parallel groups, quasi-experimental or a controlled trial

Table 2: TIDiER table describing characteristics of the interventions

Ref	PA/E group	Exercise intensity/type	Non PA/E group	Personnel delivering treatment	Individual/group	Duration frequency
Balchin 2016(8)	AE-high: (cycling) Exercised at 70–75% of HR reserve; AE-mod: (cycling) Exercised at 45–50% of HR; AE-low: kept their HRs below 120 bpm by walking and/or doing very light cycling	AE-high: VIGOROUS, AEROBIC; AE-mod: MODERATE, AEROBIC; AE-low: LIGHT, AEROBIC	NA	Not stated	Not stated	60m 3xwk/6wks
Brown 1992(9)	AE: running/aerobic exercise program and continued in regularly scheduled physical activity classes; Standard PE: regularly scheduled physical activity classes	AE: CBD [likely MODERATE to VIGOROUS], AEROBIC; Standard PE: CBD [likely MODERATE to VIGOROUS]	NA	Not stated	Not stated	(duration ns) AE: 3xwk/9wk
Carei 2010(1)	Yoga: Yoga sessions followed a yoga treatment manual. All participants received standard medical care regardless of group assignment	Yoga: CBD [likely LIGHT to MODERATE]	WL: All participants received standard medical care regardless of group assignment	Certified yoga instructor	Individual	60m 2xwk/8wk
Carter 2015(10)	TAU + CE: (circuit training): Interval pattern with 8 separate exercise-stations. The stations consisted of strengthening and aerobic exercises: abdominal and back exercises from the supine and prone positions respectively; 2 medicine ball arm-based exercises from supine position; bouncing, static and dynamic balance exercises on a trampoline; body-Weight squat exercise against the wall and stationary cycling. Following 5mins of stretching, participants were encouraged to exercise for 1min then break for 1min, this was then repeated twice more. Subsequently, participants exercised for 2min followed by a break of 1min; this was then repeated 9 times. Subsequently, a 5min stretching exercise closed the intervention.	CE: LIGHT-MOD [participant preference], AEROBIC/RESISTANCE	TAU	Qualified exercise therapist	Group	60m 2xwk/6wks
Curtis 2016(19)	Enhanced PE: The first step included minimum activity with no weight transfer: stretching, and nonstrenuous arm, leg and trunk movement. The second step included weight transfer activities and incorporated dynamic large muscle movements such as fast walk	CE: MODERATE to VIGOROUS, AEROBIC/RESISTANCE	TAU	Specialist clinical staff (nurse, dietician and exercise physiologist) and youth peer wellness coaches	Individual	(frequency, duration ns) 12wks
DelValle 2010(22)	RE: (weight training): Each session started and ended with a low-intensity warm-up and cool-down period (10–15 mins each), each consisting of stretching exercises involving all major muscle groups. The core portion of the session included 11 strength exercises engaging the major muscle groups, that is, bench press, shoulder press, leg extension, leg press, leg curl, abdominal crunch, low back extension, arm curl, elbow extension, seated row, and lateral pull-down. The participants performed 1 set of 10–15 reps until volitional fatigue per exercise, with resting periods of 1–2mins... Participants also performed isometric contractions of large muscle groups (six sets of three repetitions	RE: CBD, RESISTANCE [LIKELY MOD-VIG]	No intervention	Instructor	Group	60-70m 2xwk/12wks

	each, 20–30-s duration per repetition) with their own body weight (for lower body exercises) or barbells (1–3 kg) for upper body					
Herring 2011, 2011a(2, 3)	RE: (weight training): 7sets of 10reps were performed of leg press, leg curl and leg extension exercises beginning at 50% of the predicted 1-RM during wk 1 and progressing by 5% of the predicted 1-RM weekly. Each exercise was preceded by a warm-up set of 10 eps beginning at 35% of the predicted 1-RM during week 1 and progressing by 5% of the predicted 1-RM weekly. Each eccentric and concentric action was performed for 2s so that each set required 40s; AE: (cycling): 2 weekly sessions of 16min of continuous leg cycling were performed	RE: VIGOROUS, RESISTANCE; AE: LIGHT, AEROBIC	WL	Exercise specialists	Not stated	RE: 46m 2xwk/6wks; AE: 16m 2xwk/6wks
Hughes 2013(11)	AE: Exercise program: "Supervised exercise sessions at the Cooper Institute for the participants began by using the treadmills or stationary cycles. The CI trainers also taught patients how to complete home-based exercise sessions (e.g., choice of Wii Sports and Fit, jazz exercise, jogging, weight training based on their preferred exercise) that were unsupervised workouts at the patient's home or in the community Stretching: The series included such traditional "warm-up" stretches as: stretches of the gluts, inner thigh, calves and ankles, Achilles tendon, hamstring stretches, shoulder rolls forward and back, shoulder shrugs, isometrics for the neck hugging knees into the chest, moving forehead to right knee, then to left, then to both, and use of the pelvic tilt. An additional 10-15min consisted of moving on to right and left calf stretches, quad stretches, and then to a series for the arms, hands, fingers, wrist, biceps/triceps, shoulders and back. All of the exercises were designed to be done slowly, emphasizing proper alignment, and rest periods to minimize overall physical exertion while obtaining general flexibility. After 2 weeks of 3 sessions at CI they moved to once a week at CI and 2 home-based sessions	AE: VIGOROUS, AEROBIC; Stretching: MODERATE [aimed to be LIGHT]	NA	Cooper Institute trainers	Not stated	30-40m 3xwk/12wks
Jeong 2005(21)	Dance: Sessions were designed around 4 major themes: (a) awareness of the body, the room, and the group; (b) movement expressions and symbolic quality of movement; (c) movement, feeling, images, and words; and (d) differentiation and integration of feelings. Each of these themes included various sub-themes: (a) setting limits and outer, inner, and personal space; (b) body language, the reflecting process, polarity, and inward and outward expression; (c) playing, drawing, and verbalization; and (d) the inner sense, quality of movement, and expression of feelings	Dance: CBD [likely LIGHT-MOD]	No intervention	Not stated	Not stated	45m 3xwk/12wks
Loh 2015(20)	Walking: In the first month, participants partake in a 20-minute walking exercise per session with 5-minute warm-up and 5-minute warm down sessions. In the second month, the session increased to 30-minutes walking exercise per session with 5-minute warm-up and 5-minute warm down sessions. In the third month, the session increased to 40-minute walking exercise with	Walking; CBD [likely MODERATE], AEROBIC	TAU	Supervised by ward staff/medical officers	Group	20-40m 3xwk/12wks

	5-minute warm-up and 5-minute warm down sessions					
Parker 2016(4)	PA: This intervention was based on behavioural activation principles. Participants were provided with psychoeducation on the relationship between exercise and mood/anxiety symptoms, government guidelines for physical activity a costs and benefits worksheet about engaging in physical activity, physical activity diaries and pedometers for motivational purposes.The type of physical activity was not prescribed; rather physical activities were tailored and chosen based on theindividual participant's interests, prior activities that were enjoyable or offered a sense of achievement, current activity or perceived fitness levels, resources and social supports. The intervention included weekly goal setting, focusing on incremental changes and including incidental activities; PsychoEd (incl. PA): This intervention provided the same psychoeducation and resources as the behavioural activation intervention, as well as weekly resources focusing on sleep, substance use, and other lifestyle information. This was designed to match weekly session time spent on the intervention in the active group. There sources were discussed in terms of general utility of the content of each, but the therapists did not specifically engage with participants on how to act on the information provided. The importance of physical activity was addressed in the first session but was not included in ongoing intervention	PA: CBD [participant preference]	SC: The intervention was based on general counselling principles and was informed by the NICE guidelines for young people with mild to moderate depression The main goals of the intervention were to engage and build rapport so that the young person felt as though their concerns had been heard, that some 1 appreciated their experience and to work together on addressing current difficulties; PST: The intervention progressively worked through the 7 steps of PST, namely: (1) identifying the young person's problem/s; (2) selecting 1 or 2 key problems; (3) identifying and operationalising goals; (4) brainstorming and generating solutions;(5 exploring the risks and benefits of solutions and choosing a solution; (6) creating a SMART(specific, measurable, achievable, relevant, time-limited) plan, and (7) re-viewing progress/evaluating the plan	Research psychologists	Individual	(duration variable) 1xwk/6wks
Roshan 2011(14)	AE: The pool walking exercise was carried out in a pool with 15 meters width. The water height in the pool was considered as much as 70 to 80% of the cases' height, and they walked with respect of their height in determined water height. The activity intensity was constantly about 60-70% of maximum heart rate. On the average, the cases walked every 30-meter distances with aforesaid intensity in 50 to 60 seconds. The relaxation time between every walking was 30 to 40 seconds. The break time between the sets was 5 to 6 mins in order to allow heart rate to return to primary situation	AE: MODERATE, AEROBIC	No intervention	Not stated	Not stated	(duration ns) 3xwk/6wks
Sadeghi, 2016(15)	AE: Typically, the movements started from the head, neck or legs and continued by running in place. This stage took about 10	AE: CBD [likely MOD-VIG]	CBT: The cognitive therapy group received 12 sessions of	Sport Instructor	Not stated	AE: 45-60m/Frequency

	minutes. Then, the movements were carried on with greater intensity. The average intensity of movements was 0.60 to 0.80 heart rate. This step was faster with gestures and movements of the hands and feet separately, one-way, two-way, and cross legs. At this stage, the heart rate was measured and recorded by Radial or Carotid pulse. Duration of this period was 30 to 35 minutes. The final stage was the cooling down stage with less intensity, lasting for almost 10-15 minutes		cognitive behavior therapy, 2 sessions per week, in the first half of treatment, and 1 session per week for the second half based on the cognitive model of Michael Frey; Control: The members of the control group gathered in a classroom or the amphitheater of the Faculty of Health at KUMS. They tried to discuss the issues raised by themselves			ns/8wks; CBT: 45-60m/2xwk/8wks; Control: 45-60m/Frequency ns/8wks
Sundgot-Borgen 2002(18)	AE: The aerobic activity level was calibrated to keep participants at 50–70% of their maximal oxygen consumption (45 min of jogging, cross-country skiing, or swimming) followed by a 15-min cool down and stretching. Within the treatment program, subjects were advised to exercise at least 35 min 2 times·wk 1 without the instructor being present	AE: MODERATE to VIGOUROUS, AEROBIC	NC: Meal planning was introduced to establish and maintain a pattern of regular eating; CBT: The aim of CBT was (a) to enable patients to identify thoughts, feelings, or events before or during bulimic episodes and thereby to discover how bingeing and purging may soothe or regulate emotions; (b) to enable patients to identify and modify core beliefs that perpetuate bulimic behavior; (c) to introduce behavioral techniques to combat urges to binge or vomit, and to develop alternatives to bulimic eating patterns to cope with disturbing thoughts and emotions; and (d) to provide training in general problem-solving skills	AE: Fitness instructor; NC: Registered dietitian; CBT: Therapist	Group	AE: 60m 1xwk/16wks + 35m 2xwk/16wks w/ out instructor; NC: 120m 2xwk/2wks then 120m 1xwk/14wks; CBT: 120m 1xwk/16wks;
Ventura 2013(7)	CTr + E: computerized brain plasticity-based training focused on auditory discrimination and then switched to computerized social cognition training. These same patients exercised for 30 mins twice a week at the clinic and for 30 mins at home	E: CBD	Aftercare TAU: Involving a healthy lifestyle psychoeducational group	Not stated	Not stated	30m 3xwk/10wks
Yang 2015(6)	PA-CRT + Counselling: encouraging patients to participate in collective outdoor games, for example, joining in the collective game consisting of about 20 people. The main game is the entertainment 1, which aims at the team cooperation. As for the weekly activities, the main 1 is the collective training project, additionally; 1-2 short distance travels, hiking and picnics can be arranged	PA: CBD [likely LIGHT to MODERATE]	Counselling: At the early stage of the psychological counseling, in order to be trusted by the patients, the psychological support therapy is adopted, for example, explaination, encourage, comfort and guarantee	Not stated	Group	PA-CRT: ≥60m (depending on activity) 3-5wk/8wks; Counselling: 30m 2xwk/8wks

			methods. It is required that the doctor shall communicate with the patient in the guidance way and understand the disease reasons and sources of the patient by the means of listening in the process of communication. In the middle-late stage of the psychological counseling, the main therapies are cognitive counseling, narrative therapy, psychological counseling and behavioral therapy			
Noorbakhsh, 2013(12)	AE; Swimming	AE - CBD[likely MOD-VIG], AEROBIC	Classes as usual – Physical Education	Not stated	Not stated	60mins 3xwk/6wks
Olson, 2017(13)	AE: AE consisted of 45 min of continuous steady-state exercise performed on a treadmill or cycle ergometer at a prescribed moderate-intensity corresponding to 40–65% of HR reserve (HRR), which was determined from HR recorded during the initial baseline fitness test. Participants were instructed and encouraged to maintain this intensity during all exercise sessions. This dose of exercise is consistent with public health recommendations and has been shown to increase the likelihood of successful adherence.	AE – MOD-VIG, AEROBIC	Attention control - Stretching	Trained laboratory staff	Not stated	30-45mins 3xwk/8wks
Woolery, 2004(5)	Yoga: Subjects were taught the Iyengar approach to yoga. Classes emphasized postures that, according to the Iyengar yoga perspective, are supposed to alleviate depression, particularly back bends, standing poses, and inversions. Classes ended with relaxation postures that open the chest. All subjects were taught the same asanas, the one exception being that menstruating women practiced alternatives to inversions	Yoga: CBD [likely LIGHT to MODERATE]	WL	Certified Iyengar yoga teacher	Group	60 mins 2xwk/5wks
Wunram	EA - Cycling ergometer + TAU: The ergometer training took place on stationary cycles. A 30-min interval training calculated on the maximal performance in the previous spiroergometry results was applied. TAU followed participants therapy schedule at the inpatient units. Common therapy offers were psychotherapy in form of individual sessions with a psychotherapist or psychiatrist, group psychotherapy sessions, exercise therapy, art therapy and music therapy.	Cycling ergometer: VIGOROUS, AEROBIC	Vibration plate: The vibration plate stimulates a movement pattern similar to human gait. The training principle is based on the activation of proprioceptive spinal circuits, inducing a certain number of stretch reflex contractions per second depending of the frequency chosen. The training improves muscle power and function and coordination of the legs and the hip and also partly of the trunk, having only a small effect on the cardiovascular	Study personnel	Group and individual (range 1-6 participants)	Cycling ergometer: 30mins Vibration plate: 6 exercises x 2-3mins 1-2xwk/6wks

			system. Besides that it improves bone formation and the metabolism in skeletal muscles and skin.			
Yavari, 2008(17)	AE - Swimming	AE swimming CBD [likely MOD-VIG], AEROBIC	No intervention	Not stated	Not stated	1xwk/12-15wks

AE=Aerobic Exercise; CBT=Cognitive Behavioural Therapy; CBD: Cannot be Determined; CE=combined aerobic + resistance; CRT=Collective Rehabilitation Training; CT=Cognitive Training; E=Exercise; HR=Heart Rate; M=Minutes; MOD=Moderate; NA=Not Applicable; NC=Nutritional Counselling; NS= Not stated; PA=Physical Activity; PE=Physical Education; PST=Problem Solving Therapy; PsyEd=Psychological Education; RE=Resistance Exercise; SC=Supportive Counselling; TAU=Treatment as Usual; VIG=Vigorous; Wk=Week; WL=Wait list.

Supplementary Table 3. Search strategy used in the "Evidence Finder."

Step 1. Mental health or substance use problem	**Step 2. Stage of illness**	**Step 3. Treatment / Intervention**	**Step 3a. Treatment / Intervention**	**4. Publication date**	**5. Keywords**	**Advanced Options**
Anxiety disorders (any)	At risk (indicated or selected prevention)	Biological interventions (any)	Acupuncture/acupressure	1980-2019	None	**Systematic reviews**
Bipolar disorders	Disorder established (diagnosed disorder)	**Complementary & alternative interventions (CAM)**	Bright light therapy			**Randomised control trials**
Depressive disorders	First episode (psychosis only)	Psychological interventions (any)	Creative expression: music, dance, drama, art			**Controlled clinical trails**
Eating disorders (any)	Relapse prevention	Service delivery and improvement	Dietary advice/dietary changes			
Psychosis disorders	Treatment resistant/treatment refractory		Homeopathic, plant based medicines			
Substance use disorders (any)	Universal prevention		Massage			
Suicide and self-harm (any)			Meditation			
			Mind-body exercises (e.g. yoga, tai chi, qigong)			
			Omega 3 fatty acids (e.g. fish oil, flax oil)			
			Other complementary & alternative interventions			
			Physical activity/exercise			
			Relaxation			
			Vitamins and supplements			

Bold writing indicates where a filter has been applied. No filters were applied to steps 1, 2 and 5.

Supplementary Table 4. Risk of bias assessment for included studies

Study	Allocation concealment	Sequence Generation	Blinding of outcome assessors	Incomplete outcome data	Selective outcome reporting
Balchin 2016	unclear	unclear	low	low	unclear
Brown 1992	unclear	unclear	unclear	high	unclear
Carei 2010	low	low	low	low	unclear
Carter 2015	low	low	low	low	low
Curtis 2016	NA	NA	unclear	high	unclear
delValle 2010	low	unclear	unclear	unclear	high
Herring 2011	unclear	unclear	unclear	unclear	low
Herring 2011	low	low	low	low	unclear
Hughes 2013	low	low	low	unclear	low
Jeong 2005	low	unclear	unclear	low	unclear
Loh 2015	low	low	unclear	low	unclear
Noorbakhsh 2013	unclear	unclear	unclear	unclear	unclear
Olson 2017	low	low	unclear	low	unclear
Parker 2016	low	low	low	low	low
Roshan 2011	unclear	unclear	unclear	unclear	low
Sadeghi 2016	unclear	unclear	unclear	unclear	unclear
Sundgot-Borgen 2002	unclear	unclear	low	low	unclear
Ventura 2013	unclear	unclear	unclear	unclear	unclear
Woolery 2004	unclear	unclear	unclear	unclear	unclear
Wunram 2018	low	low	low	low	high
Yang 2015	low	low	unclear	unclear	unclear
Yavari 2008	unclear	unclear	unclear	unclear	unclear

Sequence Generation: UC = method of randomisation not stated, NA=Not applicable as study not randomised; Allocation: UC = does not specify if allocation concealment maintained, NA=Not applicable as study not randomised; Blinding of outcome assessor: UC = not specified if outcome assessor blind or not or if blinding likely to affect outcome result; Incomplete outcome data: UC = drop out numbers and/or reasons in each group not stated; H = very high dropout rates or reasons for drop out seem to differ

between groups, or excluded one participant due to non-adherence; Selective outcome reporting: UC = as no protocol paper; H = an outcome in protocol paper does not seem to be reported.

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