Table B.1.f. Mental health outcomes: Association between physical activity and measures of mental health among adults, by comparison and author

See the Supplementary materials for description of evidence of US PAGAC by outcome

Systematic review evidence Review credibility	No. of studies/ Study design No. of participants	Quality Assessment					Description of evidence Summary of findings	Certainty
		Risk of bias	Inconsistency	Indirect-ness†	Imprecision	Other		
Higher vs. lower or no PA								
Amagasa 2018 *(2)* Low	1 cross-sectional study 1 cohort study N=2,254	No serious risk of bias	No serious inconsistency	Serious indirectness	No serious imprecision	None	One cross-sectional study found that **higher vs. lower LPA** was associated with a lower risk of **psychological distress**. One cohort study for older adults in Taiwan showed that higher vs. lower LPA was associated with three dimensions of **well-being**: psychological, learning and growth, and social well-being.	VERY LOW[a]
Martinez-Dominguez 2018 *(47)* Moderate	10 RCTs N=1,463	No serious risk of bias	No serious inconsistency	No serious indirectness	Serious imprecision	None	Studies evaluated the effects of **exercise interventions that were at least 6 weeks in duration** vs. no exercise control groups reporting symptoms of anxiety among middle-aged and older women (mean age range, 54 to 78 years). Exercise interventions lasting 12 weeks to 4 months were associated with reduced **symptoms of anxiety** vs. no exercise control groups among women (SMD = -0.42 [95% CI, -0.81 to -0.02], 8 RCTs); however, no significant association was seen between exercise interventions lasting 6 to 14 months) and symptoms of anxiety among women (SMD = -0.03 [95% CI, -0.18 to 0.13], 7 RCTs).	MODERATE[b]
Perez-Lopez 2017 *(55)* Moderate	11 RCTs N=1,943	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	None	Studies evaluated the effects of **exercise interventions that were at least 6 weeks in duration** vs. no exercise control groups reporting symptoms of depression among middle-aged and older women (mean age range, 44 to 66 years). Exercise interventions lasting 12 weeks to 4 months were associated with reduced **symptoms of depression** vs. no exercise control groups among women (SMD = -0.44 [95% CI, -0.69 to -0.18], 5 RCTs) as were exercise interventions lasting 6 to 14 months (SMD = -0.29 [95% CI, -0.49 to -0.09], 6 RCTs).	HIGH[c]

Systematic review evidence Review credibility	No. of studies/ Study design No. of participants	Quality Assessment					Description of evidence Summary of findings	Certainty
		Risk of bias	Inconsistency	Indirect-ness†	Imprecision	Other		
Schuch 2018 *(61)* High	49 prospective cohort studies N=266,939	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	Possible publication bias	Studies examined the prospective relationship between **PA** and incident depression. All but one study relied on self-reported PA. Average follow-up was 7.4 years. Compared with those with low levels of PA, adults with high levels of PA had lower odds of **developing depression** (adjusted OR = 0.78 [95% CI, 0.70 to 0.87] as did older adults with high levels of PA (adjusted OR = 0.79 [95% CI, 0.72 to 0.86]).	MODERATE[d]
Schuch 2019 *(60)* Moderate	13 prospective cohort studies N=75,831	No serious risk of bias	No serious inconsistency	No serious indirectness	No serious imprecision	Possible publication bias	Studies examined the prospective relationship between **PA** and incident depression. All studies relied on self-reported PA. Average follow-up was 3.5 years. Compared with those with low levels of PA, adults with high levels of PA had lower odds of **developing anxiety** (adjusted OR = 0.81 [95% CI, 0.69 to 0.95].	MODERATE[d]
Resistance training								
Gordon 2017 *(26)* Low	16 RCTs N=922	No serious risk of bias	Serious inconsistency	No serious indirectness	Serious imprecision	None	Studies evaluated the effect of **resistance training** vs. a non-active control group on measures of symptoms of anxiety. Participants were mean age 43 years. Anxiety symptoms were the primary outcomes in 9/16 studies; most frequently reported measure of anxiety was the State-Trait Anxiety Inventory. Mean intervention length was 11 weeks and intervention frequency ranged from 2 to 5 days/week. Resistance training was found to be associated with significantly reduce **symptoms of anxiety** vs. non-active control groups (ES = 0.31 [95% CI, 0.17 to 0.44]); larger effects were seen among studies of healthy samples (ES = 0.50 [95% CI, 0.22 to 0.78]) vs. those with a physical or mental illness (ES = 0.19 [95% CI, 0.06 to 0.31]), although confidence intervals overlapped between groups. Effect sizes did not significantly vary according to other population, intervention, or study characteristics. No significant difference was found between studies examining resistance training vs. aerobic exercise training.	LOW[e]
Gordon 2018 *(25)* Low	33 RCTs N=1,877	No serious risk of bias[f]	Serious inconsistency	No serious indirectness	Serious imprecision	Possible publication bias	Studies evaluated the effect of **resistance training** vs. a non-active control group on measures of symptoms of depression. Participants were mean age 52 years. Depressive symptoms were the primary outcomes in 18/33 studies; most frequently reported measure of anxiety was the Beck Depression Inventory. Mean intervention length was 16 weeks and intervention frequency ranged from 2 to 7 days/week with 3 days/week the most common intensity. Resistance training was found to be associated with significantly reduce **symptoms of depression** vs. non-active control groups (ES = 0.66 [95% CI, 0.48 to 0.83]). No significant difference was found between studies examining resistance training vs. aerobic exercise training.	VERY LOW[g]

Abbreviations: CI = confidence interval; ES = effect size; OR = odds ratio; PA = physical activity; RCT = randomized controlled trial; SMD = standardized mean difference

† Serious indirectness indicates measurement of intermediate/indirect outcomes or heterogeneity in exposures and comparisons assessed; certainty of evidence was not always downgraded for indirectness if it was not judged to impact the certainty in the findings for the outcome evaluated in the review

[a] Certainty of evidence not upgraded given indirectness in exposure of interest (LPA only)
[b] Certainty of evidence downgraded given serious imprecision in study-specific and pooled estimates of effects
[c] Certainty of evidence downgraded given some evidence of inconsistency (range of effects) and indirectness in outcome measures
[d] Certainty of evidence upgraded given no major limitations in body of evidence; possible small studies effect not judged to warrant downgrading
[e] Certainty of evidence downgraded given serious inconsistency in direction of effects and serious imprecision in effect estimates indicating potential benefit or harm. Furthermore, pooled estimates include multiple estimates per study for different measures
[f] Effects were significantly smaller when outcome assessment was blinded compared with when outcome assessment was not blinded
[g] Certainty of evidence downgraded given serious inconsistency in direction of effects, serious imprecision in effect estimates, and presence of small studies effect. Furthermore, pooled estimates include multiple estimates per study for different measures