Table E.1.4.d.3: Effects of physical activity on anxiety/depression among people living with HIV

Questions: What is the association between physical activity and anxiety and depression? Is there a dose response association (volume, duration, frequency, intensity)? Does the association vary by type or domain of PA?
Population: People living with HIV
Exposure: Greater volume, duration, frequency, or intensity of physical activity
Comparison: No physical activity or lesser volume, duration, frequency, or intensity of physical activity
Outcome: Symptoms of anxiety or depression

Exercise modality	Study	No. of Studies No. of participants	AMSTAR 2 Score	GRADE CRITERIA					Summary of findings	CERTAINTY
				Risk of Bias	Inconsis-tency	Imprecision	Indirectness	Publication Bias		
Aerobic Exercise	O'Brien, 2016 *(67)*	24 RCTs, N=936	high	Serious risk of bias	No serious inconsistency	No serious imprecision	No serious indirectness	No serious publication bias	Mean age ranged from 30 – 45. Males accounted for 73 % of overall participants. Duration of exercise ranged from 5 – 52 weeks, 3 times a week for 20 – 120 min. Of the 24 studies that met the inclusion criteria, only 2 studies were included in a meta-analysis,(N = 65) for anxiety and depression. One meta-analysis was performed and demonstrated a significant improvement in the depression-dejection sub scale of the Profile of Mood States Scale (POMS) by a reduction of 7.68 points for participants in the aerobic exercise intervention group compared with the non-exercising control group. This represents a clinically important improvement in depression-dejection among exercisers compared to non-exercisers.	MODERATE (+ve effect)
	O'Brien, 2010 *(69)*	14 RCTs, N=454	high	Serious risk of bias	No serious inconsistency	No serious imprecision	No serious indirectness	No serious publication bias	Age of participants range from 18 – 58 years, about 30 % were female. Duration of exercise ranged from 5 – 24 weeks, 3 times a week for at least 20 min. Only 2 studies were included in a meta-analysis. One meta-analysis was performed and showed a significant improvement in the depression-dejection subscale of the POMS by a reduction of 7.68 points (95% CI: -13.47, -1.90, n=65, *P*=0.009) for participants in the aerobic exercise intervention group compared with the non-exercising control group (LaPerriere 1990, Smith 2001). This represents a clinically important improvement in depression-dejection among exercisers compared to non-exercisers.	HIGH (+ve effect)

	Nixon, 2005 *(70)*	10 RCTs, N=276	high	Serious risk bias	No serious inconsistency	No serious imprecision	No serious indirectness	No serious publication bias	Age of participants ranged from 10 – 58 years, less than 15 % were females. Duration of exercise ranged from 5-24 weeks, 3 times a week for at least 20 min. Only 2 studies were included in a meta-analysis. Meta-analysis demonstrated a significant improvement in the depression-dejection subscale of the POMS by a reduction of 7.68points (95% CI: -13.47, -1.90, n=65, p=0.009) for participants in the aerobic exercise intervention groups compared to the non-exercising control groups (LaPerriere 1990; Smith 2001). This represents a clinically important improvement in depression-dejection among exercisers compared to non-exercisers. LaPerriere 1990 found higher levels of anxiety and depression in non-exercising controls compared with exercisers. Smith 2001 (or Neidig 2003) found significant improvements in depression for exercisers compared to non-exercisers.	HIGH (+ve effect)
	O'Brien, 2004 *(74)*	10 RCTs, N=458 HIV+ only participants	high	Serious of bias	No serious inconsistency	No serious imprecision	No serious indirectness	Serious publication bias	Age of participants ranged from 18 – 58 years. Duration of exercise ranged from 4 – 24 weeks, 3 times a week for 20 to 60 min. Meta-analysis was not possible for psychological status due to the variety of outcomes used. Results of psychological measures of individual studies showed improvement in anxiety and depression (LaPerriere 1990).	LOW (+ve effect)
Resistance Exercise	No systematic reviews identified								
Multi-modal Exercise	Heissel, 2019 *(81)*	10 RCTs, N=479	low	Serious risk of bias	No serious inconsistency	No serious imprecision	No serious indirectness	Serious publication bias	Participants were 18 years and older. About 49.6 % were females. Duration of exercise was from 4 – 12 weeks, 2 – 6 times a week for 45 – 60 min. Nine studies investigated depression (n = 194 in the exercise group, n = 201 in the control group). An overall standardized mean difference SMD = −0.84 (95% CI -1.57 to −0.11) in favour of the exercise group was found in the random-effect model for post-intervention values. There was a significant overall effect (Z = 2.27, p = 0.02) of exercise compared to the control group at post-treatment. Statistical heterogeneity was high (I2 = 91%, X2 = 87.82, df = 8, p < 0.001). Five studies investigated anxiety (n = 92 in the exercise group, n = 93 in the control group). An overall standardized mean difference SMD = −1.23	MODERATE (+ve effect)

| | | | | | | | | (95% CI -2.42 to −0.04) in favour of the exercise group was found in the random-effect model for post-intervention values. There was a significant overall effect (Z = 2.03, p = 0.04) of exercise compared to the control group at post-treatment. Pre-post analysis showed that the SMD difference in the depression post analysis (−0.84) and pre-post analysis (−0.91) was 0.07 favouring the pre-post analysis. A minimal difference in SMD post minus pre-post was found for anxiety (0.04) favouring the pre-post analyses. Therefore, no substantial differences between the results and heterogeneity between post and pre-post analyses exist. | |

Abbreviations: PICO = population, intervention, comparator, outcome; RoB = risk of bias; RCTs = randomised controlled trial

1. O'Brien, 2016: Downgraded to MODERATE due to attrition and performance bias.
2. O'Brien, 2010: Not downgraded due to large effect size.
3. Nixon, 2005: Downgraded to MODERATE due to high withdrawal rates amongst the included studies. It was then upgraded to HIGH due to the evident dose-response relationship in the results.
4. O'Brien, 2004: Downgraded to LOW because the authors report a possibility of publication bias, there was also attrition bias (20% drop out in 6 studies and more than 50% dropout in 2 studies), the review is also based on a small number of trials and participants. Heterogeneity may have occurred due to a variety of exercise interventions being used. .
5. Heissel 2019: First rated LOW because of the possibility of risk of bias because, for the 10 studies that were included, five studies were graded as having good methodological quality and low risk of bias and the remaining five studies were rated as low quality studies and high risk of bias. Furthermore, Egger's test showed a publication bias for depression (bias = −8.24 (CI 95% 16.41 to −0.06). No publication bias was found for anxiety (bias = −9.66 (CI 95% -36.97 to 17.64). However, the results showed a considerable and indisputable dose-response relationship for both depression and anxiety even after sensitivity analysis. Thus, the LOW grade was upgraded to MODERATE.