Table A.2.b. Cardiometabolic health and sedentary behaviour, children and adolescents

Questions: What is the association between **sedentary behaviour** and health-related outcomes? Is there a dose response association (total volume and the frequency, duration and intensity of interruption)? Does the association vary by type and domain of sedentary behaviour?
Population: Children aged 5-under 18 years of age
Exposure: Greater volume, decreased frequency, duration or intensity of interruption of sedentary behaviour
Comparison: Lesser volume, increased frequency, duration or intensity of interruption of sedentary behaviour
Outcome: Cardiometabolic health (e.g., blood pressure, dyslipidaemia, glucose, insulin resistance)
***Importance**: CRITICAL

Black font is from original GRADE Evidence Profiles from Australian 24-Hour Movement Guidelines for Children (5-12 years) and Young People (12-17 years).*(26)* Red font denotes additions based on WHO update using review of existing systematic reviews.

	Quality Assessment							
No. of studies/ Study design **No. of participants**	**Risk of bias**	**Inconsistency**	**Indirect-ness**	**Imprecision**	**Other**	**Summary of findings**	**Certainty**	**US PAGAC evidence** *(27)*
Mean baseline age ranged between 6.7 and 16.7 years; where mean age was not reported, baseline age ranged from 5 to 19 years. Data were collected by longitudinal (n=6) and cross-sectional (n=25) study designs with up to 27 years follow up. Metabolic syndrome/cardiovascular disease risk factors were assessed as SBP, DBP, mean arterial BP, HbA1c, HOMA-IR, TG, HDL, TC/HDL ratio, metabolic syndrome risk score, insulin, glucose, non-HDL, resting heart rate, LDL, CRP, Matsuda insulin sensitivity, HOMA2-%B, OGTT-derived measures of insulin secretion (AUC I/$G_{t30\ min}$ and AUC I $G_{t120min}$), total cholesterol, apolipoprotein A1, apolipoprotein-B100, lipoprotein(a), adiponectin, leptin, VLDL TG, VLDL cholesterol, and HDL TG. All outcomes were measured objectively.								
12 Longitudinal [a] n = 23,834 **No eligible reviews identified.**	Serious risk of bias[b]	Serious inconsistency[c]	No serious indirect-ness	No serious imprecision	Dose-response gradient [d]	**Clustered Risk Score** Higher sedentary behaviour was associated with a higher clustered risk score for: 1) Accelerometer-derived sedentary time - *1/3 study*. 2) Screen time - *4/5 studies.* 3) TV - 2/2 studies. 4) Computer - *0/1 study*. **BP** Higher sedentary behaviour was associated with higher blood pressure for: 1) Accelerometer-derived sedentary time - *0/1 study*. 2) Screen time - *2/5 studies.* 3) TV - *1/3 studies.* 4) Computer - *2/2 studies (not for SBP in 2 studies).* 5) Video games - *0/1 studies.* **Cholesterol** Higher sedentary behaviour was associated with lower cholesterol for: 1) Accelerometer-derived sedentary time - *1/1 study (for HDL in 1 study).* 2) Screen time - 0/3 *studies.* 3) TV - *1/2 studies (for HDL in 1 study).* 4) Computer - *0/1 study.* **Insulin** Higher sedentary behaviour was associated with higher insulin for: 1) Screen time - *1/1 study.*	LOW[e]	4 ESRs Limited evidence suggests that greater time spent in sedentary behaviour is related to poorer cardiometabolic health; the evidence is somewhat stronger for television viewing or screen time than for total sedentary time. **PAGAC Grade: Limited.**

						2) TV - *1/1 study.* 3) Computer - *1/1 study.* **TG, HOMA-IR, Glucose, Other** Sedentary behaviour was not associated with other individual risk factors for the majority of studies.		
25 Cross-sectional[f] n = 69,342[j] **No eligible reviews identified.**	Serious risk of bias[g]	Serious inconsistency[h]	No serious indirect-ness	No serious imprecision	Exposure/outcome gradient[i]	**Clustered Risk Score** Higher sedentary behaviour was associated with a higher clustered risk score for: 1) Accelerometer-derived sedentary time - *1/3 studies*. 2) Long accelerometer-derived sedentary bouts (≥5 min) - *0/2 studies*. 3) Screen time - *3/3 studies* (only in females for 1 study). 4) TV - *6/10 studies* (only for females in 1 study). 5) Computer - *1/6 studies* (only for males in 1 study). 6) Video game - *1/3 studies* (only for males and weekends in 1 study). 7) Total sedentary behaviour – 0/2 studies. 8) Resting - *1/1 studies*. Higher sedentary behaviour was associated with a lower clustered risk score for: 1) Accelerometer-derived sedentary breaks - *1/2 studies.* 2) Short accelerometer-derived sedentary bouts (1-4 min) - *1/1 study*. **BP** Higher sedentary behaviour was associated with a higher BP for: 1) Accelerometer-derived sedentary time - *0/5 studies.* 2) Accelerometer-derived sedentary bouts - *0/2 studies.* 3) Accelerometer-derived sedentary breaks - 0/2 studies. 4) Screen time - *2/5 studies* (not for SBP in 1 study). 5) TV - *5/8 studies* (only males in 1 study and not for SBP in 1 study). 6) Computer - *1/6 studies.* 7) Video games - *1/3 studies* (not for SBP or mean atrial pressure in 1 study). 8) Total sedentary time - *0/2 studies.* Higher sedentary behaviour was associated with a lower BP for: 1) Reading - *1/2 studies*. 2) Homework - *1/1 study* (not for DBP or mean atrial pressure in 1 study). **Cholesterol** Higher sedentary behaviour was associated with a lower cholesterol for: 1) Accelerometer-derived sedentary time - *0/5 studies* 2) Accelerometer-derived sedentary bouts and breaks - *0/3 studies.* 3) Screen time - *1/4 studies (for HDL in 1 study).* 4) TV - *3/7 studies* (1 study was for non-HDL and 2 studies were HDL, no association with LDL in 2 studies or total cholesterol in 1 study). 5) Computer - *1/4 studies* (for HDL in 1 study, only in males for 1 study) 6) Video games - *0/1 study* 7) Total sedentary behaviour – 0/2 studies Higher sedentary behaviour was associated with a higher cholesterol for: 1) Listening to music - *1/1 study* (for HDL in 1 study).	VERY LOW[k]	

						TG, HOMA-IR, Insulin, Glucose, CRP, Other Sedentary behaviour was not associated with other individual risk factors for the majority of studies.		

Abbreviations: TV = television viewing; HDL = high-density lipoprotein cholesterol; LDL = low-density lipoprotein cholesterol; VLDL, very low-density lipoprotein cholesterol, TG = triglycerides; SBP = systolic blood pressure; DBP = diastolic blood pressure; BP = blood pressure; HOMA-IR = homeostatic model assessment of insulin resistance; CRP = C-reactive protein; OGTT= Oral glucose tolerance test; HbA1c= glycated haemoglobin; TC=total cholesterol; AUC I = Area under the curve of insulin; min = minutes.

*As determined by WHO

[a]Includes 12 longitudinal studies *(50-55)*.

[b]Out of the 5 studies that used a subjective measure of sedentary behaviour, information on psychometric properties of the sedentary behaviour survey items were not provided.

[c]Mixed results observed. No serious inconsistency for screen time.

[d]A dose response gradient for higher screen time, sedentary time with higher cardiometabolic risk was observed for ~~5~~8 studies *(50, 52-55)*.

[e]The quality of evidence for longitudinal studies could not be upgraded from "low" due to serious risk of bias, was downgraded to "very low" due to serious inconsistency but upgraded to "low" due to a dose-response effect.

[f]Includes 25 cross-sectional studies *(40, 41, 56-78)*.

[g]Out of the 21 studies that used a subjective measure of sedentary behaviour, information on psychometric properties of the sedentary behaviour items were only provided in 6 studies *(41, 65, 71-74)*. One study did not report psychometric properties *(58)* but used the same sample of another study where psychometric properties were reported *(71)*.

[h]Mixed results observed.

[i]A gradient for higher TV, screen time, video games, computer, sedentary bouts, sedentary breaks, sedentary time with higher cardiometabolic risk was observed for 6 studies *(56, 58, 64, 74, 75, 78)* and lower risk for 2 studies *(59, 71)*.

[j]4 studies used data from the Quebec Adiposity and Lifestyle Investigation in Youth study *(58, 66, 67, 71)* and 2 studies used data from the German Health Interview and Examination Survey for Children and Adolescents study *(41, 57)*.

[k] The quality of evidence for cross-sectional studies was downgraded to "very low" from "low" due to serious risk of bias and serious inconsistency.