Table S1: Modified Newcastle-Ottawa scale for study assessment of methodological quality

	Cardio-respiratory									Cardio-metabolic						
	Lowe et al 2015	Nixon et al 2010	Clemm et al 2015	Clemm et al 2014	Welsh et al 2010	Morales et al 2018	Joshi et al 2013	Franchi et al 2015	Takken et al 2010	Redman 2014	Gaskin et al 2010	Fewtrell et al 2004	Sharafi et al 2016	Kajantie et al 2010	Giacoia et al 1997	Tinnion 2016
Selection																
1)Representativeness of the exposed cohort																
A: truly representative (regional/national)	X		X	X	X											
B: somewhat representative (multi/single centre)		X					X			X	X	X	X	X		X
C: Selective group (exclusion criteria)						X		X	X						X	
D: not described																
2) Selection of the none exposed cohort																
A: same community as exposed (PA)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
B: different source																
C: not described																
3) Ascertainment of PA																
A: accelerometer /observed	X				X	X										X
B: structured interview		X						X		X	X	X			X	
C: written self report			X	X			X		X				X	X		
D: not described																
Selection subtotal Score (out of three)	3	3	2	2	3	2	2	2	1	3	3	3	2	2	2	3
Comparability																
1) Comparability of cohorts on the basis of design or analysis																
A: Controls for sex	X	X	X	X				X		X	X	X	X	X	X	
B: Controls for prematurity, BPD	X	X	X	X	X	X	X	X		X		X	X	X	X	
Selection subtotal Score (out of two)	2	2	2	2	1	1	1	2	0	2	1	2	2	2	2	0
Outcome																
1) Assessment of outcome																
A: independent blind (for PA) assessment	X	X	X	X	X	X	X		X	X	X	X				X
B: record linkage													X	X	X	
C:self-reported																
D: non-blind assessment								X								
E: no description																
2) Assessment of Study																
A) For cohort studies																
A: complete																
B: >80% follow-up or well described lost group	X	X	X	X	X					X	X		X	X		X
C:<80% follow-up and no description												X				
D: no statement																
B) for case control studies: non-response rate																
A: same for both groups						X									X	
B: non-respondents described									X							
C: rate different and no designation							X	X								
Selection subtotal Score (out of two)	2	2	2	2	2	2	1	0	1	2	2	1	2	2	2	2
TOTAL SCORE	7	7	6	6	6	5	4	4	2	7	6	6	6	6	6	5

Stars were awarded if the study met the specified criteria (highlighted in light gray). The total rating score ranges from 0 to 7 “stars”, with 7 indicating the highest quality.

Table S2: Physical activity and FEV1: description of included studies and their results

Authors	Study description	Results
Correlation found with FEV1		
DEX-Trial(16)	Cross sectional follow up data of preterm born very low birth weight (VLBW, <1500g birth weight) children (N=65, age 8-11 years) with prolonged ventilator dependence randomized to postnatal dexamethasone treatment from the USA are analysed. FEV1 in all preterm children was significantly reduced compared to reference values. Vigorous physical activity was calculated from a questionnaire recalling activities during the last year.	The FEV1 correlated with average hours spent per week participating in vigorous physical activity (r = 0.30; P = .03) in preterm born children.
CARDIFF(30)	A cross sectional study from the UK analysed very preterm born children with BPD (N=62, age 8-12 years). FEV1 was significantly reduced compared to very preterm born without BPD and term born controls. Very preterm born infants with BPD reported less physical activity per week compared to very preterm born without BPD or term controls.	A moderate correlation between reported physical activity and the lowest FEV1 after exercise was found (R = 0.43; P < .001) in preterm born children.
No correlation found with FEV1		
Barcelona(20)	The Barcelona study (N=20, age 5 years) randomized extremely preterm with BPD to a 4 week PA training program twice a week lasting 30-50min. including interval training, peripheral muscle strength exercises, peripheral muscles stretching and chest flexibility. FEV1 was within reference values for control and intervention group.	FEV1 improved in the intervention group (102±16 vs. 104±17) but not in the control group. However, pre-and post-intervention ΔFEV1 did not differ significantly between both groups (p=0.19).
ALSPAC(21)	The Avon Longitudinal Study of Parents and Children cohort from the UK (N=302, age 11 years) analysed different gestational age groups (very, moderate, late preterm and term born). Previously measured FEV1 (at age 8 years)(28) was reduced in very and moderately preterm born children compared to term born peers. FEV1 values were still within the normal range. Physical activity was measured by accelerometer and did not differ between all gestational age groups.	Lung function measures was plotted against values of physical activity and showed no significant correlations. The best model fit was seen in very preterm born children, but FEV1 and physical activity (accelerometer data) were not significantly correlated (r^2=0.1, p=n.s.).
NORWAY 91(26)	In a Norwegian cohort (1991-1992, N=35/26) cross sectional data of very preterm individuals compared to term born controls were analysed. At age 10 and 18 the FEV1 was lower in the very preterm born group compared to controls but within the reference range. Physical activity was enquired per questionnaire as times and hours per week. Very preterm born individuals reported less physical activity at 10 and 18 years compared to peers.	FEV1 was not correlated to the level of physical activity at both ages analysed in preterm or term individuals.
NORWAY 82(25)	In a Norwegian cohort (1982-1985, N=40/34) cross sectional data of very preterm born adults compared to term born controls were analysed. At age 18 and 25 the FEV1 was lower in the very preterm born group compared to controls but within the reference range. Physical activity was enquired per questionnaire as times and hours per week. Preterm born adults reported less physical activity at age 18 years but not at 25 years compared to peers.	FEV1 was not correlated to the level of physical activity at both ages analysed in preterm or term born adults.
SIENA(29)	A small cross sectional Italian study analysed very preterm born boys with BPD (N=6, age 10-18 years). FEV1 was within normal reference values. Participation in sport clubs or classes was enquired.	No correlation between FEV1 and sport participation could be seen in the presented data of preterm born children with BPD.
PILOT(31)	A small cross sectional study from the Netherlands (N=11, age 7-8 years) analysed very preterm born children. They reported a significantly lower FEV1 compared to reference values. A physical activity record over 3 days was used to calculated energy expenditure from an activity record.	No association was found between physical activity analysed as energy expenditure and FEV1 in preterm born children.

Table S3: Physical activity and pVO2: description of included studies and their results

Authors	Study description	Results
Correlation found with pVO2		
EPICURE(22)	The UK EPICURE cohort (N=38, age 11 years) analysed cross sectional data of children born at <25 weeks of gestation. Preterm born children showed a reduced pVO2 compared to term born peers with a mean below the reference range(37). Physical activity was measured by accelerometer. Physical activity measurements were very low in the extremely preterm (9 min/day) as well as term born (11 min./day) controls compared to the recommended 60min/day(7).	A very weak within-subject correlation between pVO2 and activity counts/min as measured by accelerometer was reported (R^2=0.07; p<0.03) in extremely preterm and term born children.
Barcelona(20)	The Barcelona study (N=20, age 5 years) randomized extremely preterm with BPD to a 4 week PA training program twice a week lasting 30-50min. including interval training, peripheral muscle strength exercises, peripheral muscles stretching and chest flexibility. Cardiorespiratory capacity was determined by the incremental shuttle walk test (ISWT) and below the expected reference values (control 45%, intervention 31%).	Cardiorespiratory capacity improved in the intervention but not the control group (ΔISWT 217±221m vs. 17±58m).
NORWAY 91(26)	In a Norwegian cohort (1991-1992, N=26, age 18 years) cross sectional data of very preterm individuals compared to term born controls were analysed. At age 18 pVO2 did not differ in very preterm and term born individuals and was within reference range(56). Physical activity was enquired per questionnaire as times and hours per week. Preterm born individuals reported less physical activity compared to peers.	Physical activity was positively associated with pVO2 in both very preterm and term born groups at age 18.
NORWAY 82(25)	In a Norwegian cohort (1982-1985, N=40/34) cross sectional data of very preterm born adults compared to term born controls were analysed. At age 18 and 25 pVO2 did not differ significantly from the control cohort and was within reference range(56). Physical activity was enquired per questionnaire as times and hours per week. At age 18 the very preterm born group reported less physical activity compared to the control groups, while at age 25 the groups did not differ.	Physical activity was at both ages positively associated with pVO2 in very preterm and term born adults. (linear regression analyses, p<0.001 at age 18; mixed linear model p = 0.053 at age 25)
No correlation found with pVO2		
NORWAY 91 (17)	In a Norwegian cohort (1991-1992; N=35, age 10 years) cross sectional data of very preterm individuals compared to term born controls were analysed. At age 10 pVO2 did not differ significantly from the control cohort and was within reference range. Physical activity was enquired per questionnaire as times and hours per week. At age 10 very preterm born engaged in less physical activity than term born children.	Adjusted for gender, increased physical activity was not associated with peak VO2 at age 10 in both very preterm and term group.
PILOT(31)	A small cross sectional study from the Netherlands (N=11, age 7-8 years) analysed very preterm born children. Values of pVO2 were within reference range. A physical activity record over 3 days was used to calculated energy expenditure from an activity record.	There was no correlation found between physical activity and pVO2 in very preterm born children.

Table S4: Physical activity and body mass index: description of included studies and their results

Authors	Study description	Results
Correlation found with BMI		
MLS (33)	The US Maternal and Lifestyle Study (N=305, age 11 years) reported high rates of obesity (BMI>95th centile: 24%) and overweight (BMI 85th to 95th centile: 17%) in very preterm or moderate to late preterm with high social risk (polysubstance abuse during pregnancy). Physical active children engaged 5 times per week for at least 30 min. in moderate to vigorous activity by parental report. Activity status was enquired at age 8, 9, 10 and 11. If the child was inactive at 3 or all 4 follow up visits the child was classified as physical inactive. While longitudinal data for physical activity were analysed, the outcome was only controlled for birth weight but not overweight/obesity status prior to the assessment of physical activity.	Physical inactivity was independently and significantly associated with an increased risk for obesity (OR: 2.13 (1.02–4.37)) or overweight (OR: 2.12 (1.01–4.46)) at age 11.
WAVE VIII(27)	A US cohort (N=129, age 23 years) reported cross sectional data of preterm born young adults (<37 weeks of gestation, birth weight <1850g) compared to term born controls. BMI and physical activity inquired as days with vigorous activity per week did not differ between the groups.	A greater level of physical activity was associated with a lower BMI (b =- 0.18, P < .05) in preterm born adults.
HeSVA(18)	A Finish cohort (N=163, age 22 years) reported cross sectional data of VLBW preterm born adults. BMI did not differ in between VLBW preterm born and controls. VLBW preterm born reported less conditioning physical activity.	VLBW preterm born adults with short session duration of conditioning physical activity had a higher BMI (OR: 1.7 kg/m2 (95% CI, 0.4-3.0)).
No correlation found with Body mass index		
Fortsyth(24)	A cross sectional study from the US (N=165, age 14 years) was the only one designed to investigate an association of physical activity with body composition in VLBW preterm born adolescents compared to term born controls. BMI did not differ between the groups. While rates of obesity were higher in VLBW preterm born (21% vs. 13%), BMI variation in VLBW preterm individuals was larger (BMI z-value 5th-95th: preterm (-1.557, 2.277) vs. term (-0.700, 2.198)). Vigorous activity (hours/week) was calculated from a questionnaire recalling physical activities during the last year. VLBW preterm girls but not boys reported a lower rate of vigorous physical activity compared to term born peers.	BMI was correlated to vigorous physical activity in term born teenager (Spearman correlation: -.293, p<0.05) but not in the VLBW preterm born group (Spearman correlation: -0.073, p=n.s.).
GROWMORE(23)	The UK Growmore cohort (N=60, age 12-19 years) analysed cross sectional data of very and low birth weight preterm born children and young adults. BMI was lower than reference values. Physical activity was measured by accelerometer data and was below the recommended time for that age group.	Accelerometer data of moderate to vigorous activity (> 2294 counts/minute) were not correlated to BMI (p=0.99).

Table S5: Physical activity and body composition: description of included studies and their results

Authors	Study description	Results
Correlation with fat mass		
Oklahoma(34)	A small cross sectional US study (N=24, age 10-15 years) analysed very preterm (with and without BPD) and term born teenager. Fat mass did not differ between all groups. Parents classified their children as “sedentary”, “moderately active” or “active” (=competitive sport). Activity levels were significantly lower in very preterm born children with BPD.	Fat mass but also lean body mass was higher in all physically active groups ($p<0.01$) in preterm and term born children. However, differences between groups disappeared after controlling for age.
Correlation with body fat percentage		
Forsyth(24)	A cross sectional study from the US (N= 165, age 14 years) compared VLBW preterm born teenager to term born controls. They reported a lower body fat percentage in VLBW preterm compared to term born controls. Vigorous activity (hours/week) was calculated from a questionnaire recalling physical activities during the last year. VLBW preterm girls but not boys reported a lower rate of vigorous physical activity compared to term born peers.	Body fat percentage (-0.418; $p<0.01$) was negatively associated with the amount of vigorous activity. After stratifying for gender only VLBW preterm girls showed a significant correlation between body fat percentage and vigorous physical activity. 75 min. of vigorous activity per week was independently correlated to body fat percentage in VLBW preterm girls. While being born premature explained 5%, the amount of vigorous activity explained another 7% of the variance in of body fat percentage.
HeSVA(18)	A Finish cohort (N=163, age 22 years) reported cross sectional data of VLBW preterm born adults. No difference in body fat percentage between VLBW preterm born and controls were noticed. VLBW preterm born reported less conditioning physical activity.	Low frequency of physical activity was associated with a lower body fat percentage (OR: 1.9% (95% CI, 0.6-3.3)).
Correlation with fat mass index		
CIKL(35)	A cohort from the UK (N=497, age 8-12 years) reported cross sectional data in preterm (<37 weeks of gestation, birth weight <1850g) compared to term born controls. Preterm born children had a lower fat mass index. The activity level was enquired from parents and classified as “less”, “same”, “more”, “much more” compared to peers	A higher activity level was independently related with lower fat mass index (Coefficient: -0.12, T:-3.7; $p<0.001$) in a stepwise multiple regression controlling for prematurity, sex, puberty and age.
Forsyth(24)	A cross sectional study from the US (N= 165, age 14 years) compared VLBW preterm born teenager to term born controls. No difference in fat mass index compared to term born controls was seen. Vigorous activity (hours/week) was calculated from a questionnaire recalling physical activities during the last year. VLBW preterm girls but not boys reported a lower rate of vigorous physical activity compared to term born peers.	Fat mass index was negatively correlated to the amount of vigorous activity (Coefficient: -0.336; $p<0.01$).
No correlation found with fat mass index		
GROWMORE(23)	The UK Growmore cohort (N=60, age 12-19 years) analysed cross sectional data of very and low birth weight preterm born children and young adults. The reported fat mass index cannot be compared to reference values due to the wide age range and missing differentiation for boys and girls. Physical activity was measured by accelerometer data and was below the recommended time for that age group.	Accelerometer data of moderate to vigorous activity (> 2294 counts/minute) were not correlated to the fat mass index ($p= 0.27$).