Body composition, physical activity and fitness in children with moderate-to-severe intellectual disability.

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Introduction: The prevalence of overweight and obesity has been rising in most parts of the world over the past two decades (1, 2). This rise could pose even a greater problem for people with intellectual disability (ID) because they are more likely to be obese than people without ID (3). Furthermore, research has shown that a sedentary lifestyle is more prevalent among people with ID than otherwise healthy people in modern society (4). In the general population, the adverse effects of obesity on health begin early in life and physical inactivity and adiposity are associated with metabolic diseases and cancers (5). In contrast, higher levels of physical activity and aerobic fitness have been associated with lower risk for metabolic diseases (6, 7). Although it is anticipated that children with ID experience the same adverse effects of health from obesity and lack of physical activity and aerobic fitness, it has not been comprehensively studied. In this context the purpose of this study was to investigate body composition, physical activity and fitness among children with moderate-to-severe ID.
Methods: The participants came from a special school for children with moderate-to-severe ID (admission to the school is based on intelligence quotient $\leq$50) in Reykjavik, Iceland. All children attending the school that were able to cycle on a stationary bicycle were offered to take part in the study. Parents of 42 children (out of 55, 76.3% participation rate) aged 6.5-16.5 years gave informed consent and only one child dropped out of the study. All the children underwent measures of height, weight, waist circumference and skinfold thickness, and the body mass index was calculated. Resting blood pressure measurements were also obtained from all but one child. Maximal oxygen uptake was measured during a graded bicycle ergometer test and used as the objective measures of aerobic fitness (8). Not all of the children were able to do the maximal oxygen uptake test during their first aerobic fitness testing session. However, we obtained a measure of submaximal aerobic fitness (physical work capacity at heart rate 170 beats/min [PWC-170]) from all of the children except two. Similarly, all but two children could undergo the physical activity measurement, which was objectively acquired with Actigraph activity monitors. Each participant wore the activity monitors for 6 consecutive days including both weekend days, and the counts were summed over 5 sec periods. Only data from children with at least 10 hours of recording per day from at least two weekdays and one weekend day were included. Body composition was measured by dual energy X-ray absorptiometry (DXA). Five children were unable to lie still during the body composition measurements by DXA. The statistical analysis was performed by SPSS 18.0 and consisted mostly of descriptive statistics.
Results: The physical characteristics of the participants along with their fitness and physical activity levels are presented in tables 1 and 2.

Table 1: *Children characteristics*

	Age yr	Height cm	Weight kg	BMI kg/m^2	Waist cm	SKF mm	Fat %	SBP mmHg	DBP mmHG
Girls	12.9	146.3	47.3	21.6	70.3	93.7	33.5	121.1	75.1
	(2.0)	(18.2)	(15.5)	(4.7)	(10.1)	(32.9)	(7.4)	(10.3)	(14.0)
Boys	12.8	154.0	53.2	21.5	76.7	83.0	32.0	114.7	75.6
	(2.9)	(15.0)	(22.0)	(6.4)	(17.0)	(50.2)	(12.2)	(15.0)	(8.1)

Values are means (SD). SKF = sum of 4 skinfolds, SBP = systolic blood pressure, DBP = diastolic blood pressure.

Table 2: *Aerobic fitness and physical activity of the children*

	Fitness ml/kg/min	PWC-170 W/kg	PA weekday counts/min	PA weekend counts/min
Girls	36.2 (4.2)	1.4 (0.3)	436.5 (137.8)	357.9 (104.0)
Boys	38.4 (9.8)	1.5 (0.4)	578.5 (258.0)	472.3 (272.7)

Values are means (SD). PA = physical activity.

The children had higher prevalence (34.1%) of overweight/obesity (9) than has been reported for 9 and 15 year-old Icelanders (1). Blood pressure was also elevated in 42.5% of the children (10) and 31.0% had larger waist circumference than is recommended (10). These children also had much greater (58.5-129.2%) skinfold thickness than both 9 and 15 year-old Icelandic children (7, 11). Furthermore, their aerobic fitness level was considerably lower than among Icelandic 9 and 15 year-olds (7, 8), especially for boys (27.0% lower). Finally, although the physical activity of the ID children was somewhat lower than in 9 and 15 year-old children (11, 12), the differences were not large (10.4-20.8%).

Discussion: This study demonstrates that it is possible to conduct complex epidemiological studies on children with moderate-to-severe ID. However, the measurements take much longer time and more familiarization sessions are needed than with non-ID children. We also conducted only one or two measurements in a testing session and accepted that children with severe ID might not be able to complete all testing. The results of this study support what studies on children with mild-to-moderate ID have reported, or that children with moderate-to-severe ID are at a higher risk for developing health problems than children without ID. However, larger studies over wider range of ID employing a non-ID control group are needed.

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