



Leisure Time Physical Activity in Young Adults Born Preterm

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Objective To evaluate the amount of self-reported physical activity in young adults born prematurely compared with those born at term.

Study design Unimpaired participants of the Preterm Birth Study (Preterm Birth and Early Life Programming of Adult Health and Disease) birth cohort study were studied at age 23.3 ± 1.2 (SD) years: 118 born early preterm (<34 weeks), 210 late preterm (34-36 weeks), and 311 born at term (≥ 37 weeks, controls). The participants completed a validated 30-item, 12-month physical activity questionnaire. The annual frequency and total volume of conditioning and nonconditioning leisure time physical activity and commuting physical activity were calculated and the data analyzed by means of linear regression.

Results Adults born early preterm reported a 31.5% (95% CI, 17.4-43.2) lower volume of leisure time physical activity (in metabolic equivalents [MET] h/year) and had a 2.0-fold increased OR (1.2-3.3) of being in the least active quintile than controls. Lower amounts of conditioning, nonconditioning, and commuting physical activity all contributed to the difference. In addition, early preterm participants undertook less vigorous physical activity (≥ 6 MET). No differences in physical activity were found between the late preterm and control groups. Adjustments for potential early life confounders and current mediating health characteristics did not change the results.

Conclusions Young adults born early preterm engage less in leisure time physical activities than peers born at term. This finding may in part underlie the increased risk factors of cardiometabolic and other noncommunicable diseases in adults born preterm. Low physical activity is a risk factor for several noncommunicable diseases and amenable to prevention. (*J Pediatr* 2017;189:135-42).

Every year, approximately 14.9 million infants worldwide (11% of all newborns) are born preterm (<37 weeks of gestation).¹ There is extensive evidence that preterm adults born at a very low birth weight (VLBW; <1500 g) or extremely low birth weight (ELBW; <1000 g) have higher levels of risk factors for chronic noncommunicable disease, including higher blood pressure, impaired glucose regulation, lower bone mineral density, and obstructive airflow.²⁻⁵ However, these individuals constitute only a small proportion of all preterm infants. Of all preterm infants in the United States, for example, 70% are born late preterm, between 34 and 36 weeks of gestation.⁶ Recent evidence suggests that many of these adverse consequences of preterm birth are present in those born late preterm and increase with the degree of prematurity.^{5,7,8}

Physical inactivity is related to increased levels of risk factors for noncommunicable disease and this could in part explain them in those born preterm. Studies among children and adolescents born extremely preterm (≤ 28 weeks or ≤ 1000 g)^{9,10} or with ELBW¹¹ or VLBW¹² suggest lower reported levels of physical activity compared with those born at term or of normal birth weight. However, some small studies among VLBW or preterm children have revealed no differences.^{13,14} Adolescents and adults born preterm with VLBW or ELBW report substantially lower amounts of physical activity^{15,16} and have lower levels of cardiorespiratory and muscular fitness.^{12,17} We recently showed that lower fitness is also seen among the much

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ELBW	Extremely low birth weight
ESTER	ESTER Preterm Birth Study (Preterm Birth and Early Life Programming of Adult Health and Disease)
GSD	Geometric standard deviation
MET	Metabolic equivalent
SGA	Small for gestational age
VLBW	Very low birth weight

larger group of early (<34 weeks) and young adults who were born late preterm.¹⁸ Whether these adults actually perform less physical activity is uncertain.

We studied self-reported physical activity in unimpaired young adults born at early or late preterm gestational ages. We hypothesized that preterm young adults would report less physical activity than young adults who were born at term. We also hypothesized that lower physical activity among those born prematurely would not be fully explained by conditions underlying preterm birth.

Methods

The Preterm Birth and Early-Life Programming of Adult Health and Disease (ESTER) Preterm Birth Study involves 1890 young adults recruited through the Northern Finland Birth Cohort 1986 (born in 1985-1986; 49.8%) and via the Finnish Medical Birth Register (born in 1987-1989; 50.2%).⁸ In 2009-2011, 753 individuals with verified durations of gestation participated in a clinical study at 23.3 ± 1.2 (SD) years of age.¹⁹ After exclusions (Figure 1), 118 participants born early preterm, 210 born late preterm, and 311 controls born at term (≥ 37 weeks) were unimpaired (no mental or physical disability), nonpregnant, and had complete data on self-reported physical activity.

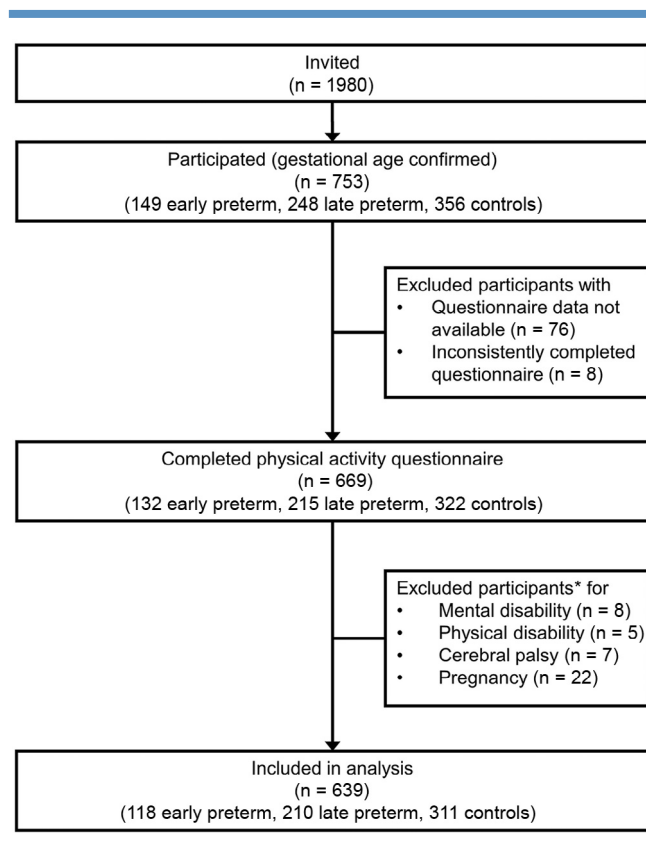


Figure 1. Flow chart of the study population. Early preterm is <34 gestational weeks; late preterm is 34-36 gestational weeks. *One person can have >1 reason for exclusion.

This study was approved by the Coordinating Ethics Committee at Helsinki and Uusimaa Hospital District. The participants provided a signed informed consent document.

For participants recruited through the Northern Finland Birth Cohort 1986, perinatal data were collected previously.²⁰ Corresponding data from hospital and maternal welfare clinic records were obtained for those invited through the Finnish Medical Birth Register. Through these data, the duration of gestation was confirmed (determined by ultrasonography in 62.7% and 53.1% of preterm infants and controls, respectively).^{8,19} The study groups were defined by the duration of gestation as early preterm (<34 weeks), late preterm (34-36 weeks), and controls born at term (≥ 37 weeks). Diagnoses of maternal gestational diabetes, hypertension (gestational or chronic), or preeclampsia (including superimposed) were confirmed according to prevailing criteria.^{21,22} Small for gestational age (SGA) was defined as a birth weight of >2 SD below the mean for gestational age.²³

The mean of 3 measurements was calculated for height. Body weight and composition were assessed using segmental multi-frequency bioelectrical impedance equipment (InBody 3.0, Biospace Co, Seoul, South Korea). Medical history, medication, socioeconomic status, and lifestyle data were collected via questionnaires. Childhood socioeconomic status was assessed as the education level of the more highly educated parent.⁸

Self-Reported Physical Activity

During the visit to the research clinic, the participants completed the modified Kuopio Ischemic Heart Disease Risk Factor Study questionnaire for detailed assessment of 12-month physical activity history.²⁴ The reproducibility and validity of the questionnaire have been confirmed.^{16,25-28} The questionnaire comprises a 30-item list of types of physical activity, including conditioning leisure time physical activity (20 items; eg, running, skiing, swimming), nonconditioning leisure time physical activity (8 items; eg, household work, gardening, shoveling snow), physical activity from commuting to work (walking or cycling), and a category for other physical activity specified by the participant. The participants reported the monthly frequency and duration of each physical activity session for the previous 12 months and rated the average intensity of activities on a scale of 0 to 3 (0 = light, 1 = moderate, 2 = strenuous, 3 = very strenuous).

Data Analysis

The self-reported monthly frequency of physical activity was converted into times/year, and the average duration of each physical activity session was summed and converted into hours/year. The self-rated average physical activity intensities were converted into metabolic equivalents (METs) using the Compendium of Physical Activities.²⁹ An intensity of 1 MET corresponds with an energy expenditure of 1 kcal/kg/hour, equivalent to the energy cost of sitting quietly. The total volume of physical activity in conditioning and nonconditioning leisure time physical activity and commuting physical activity were

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