swiss medical weekly

ORIGINAL ARTICLE
CC BY 4.0

Physical activity and screen time in children and adolescents born very preterm: a cross-sectional study

Sarah R. Haile[1], Gabriela P. Peralta[2,3,4], Mark Adams[5], Antonella L. Saponaro[1], Ajay N. Bharadwaj[1,6], Dirk Bassler[5], Alexander Moeller[7], Giancarlo Natalucci[7,8], Thomas Radtke[1], Susi Kriemler[1]

1 Epidemiology, Biostatistics and Prevention Institute (EBPI), University of Zurich, Zurich, Switzerland; 2 ISGlobal, Barcelona, Spain; 3 Universitat Pompeu Fabra (UPF), Barcelona, Spain; 4 CIBER Epidemiología y Salud Pública (CIBERESP), Madrid, Spain; 5 Newborn Research, Department of Neonatology, University of Zurich and University Hospital Zurich, Zurich, Switzerland; 6 Department of Health Sciences and Technology, Swiss Federal Institute of Technology Zurich, Zurich, Switzerland; 7 Department of Respiratory Medicine and Childhood Research Center, University Children's Hospital Zurich, Zurich, Switzerland; 8 Larsson-Rosenquist Centre for Neurodevelopment, Growth and Nutrition of the Newborn, Department of Neonatology, University of Zurich and University Hospital Zurich, Zurich, Switzerland

Published
30 October 2026

doi
https://doi.org/10.57187/4823

Cite this as
Swiss Med Wkly. 2026;156:4823

Correspondence
Prof. Dr. med. Susi Kriemler
susi.kriemlerwiget[at]uzh.ch

Summary

OBJECTIVE: We aimed to assess physical activity and screen time in a cohort of very preterm-born children and adolescents (aged 5–16 years), in comparison with their full-term siblings. We also aimed to identify potential correlates of these lifestyle factors among the very preterm-born.

DESIGN: Cross-sectional survey in the greater Zurich area of Switzerland.

PATIENTS: Children born <32 weeks gestation (n = 482) as well as their full-term siblings (n = 149).

MAIN OUTCOME MEASURES: Physical activity (hours per day or meeting recommendations with >1 hour per day) and screen time (hours per day or <2 hours per day).

METHODS: Linear/logistic regression accounted for age group, sex and family unit. A classification tree analysis explored potential correlates of physical activity and screen time among the very preterm-born.

RESULTS: Physical activity of very preterm-born children was similar to that of their full-term siblings, but only one-third of participants met physical activity requirements (i.e. at least 1 hour per day). Screen time was similar in both groups, but much higher among adolescents regardless of preterm birth status. Chronic conditions and respiratory symptoms were not associated with insufficient physical activity. No correlates were identified for physical activity, while age group and socioeconomic status were associated with screen time.

CONCLUSIONS: No differences in physical activity and screen time were observed between very preterm-born children and their full-term siblings, but only one-third of participants met physical activity recommendations. Both groups were observed to be less active than the general population. Neither respiratory symptoms nor chronic conditions explained variation in these lifestyle outcomes. Both very preterm-born children and adolescents and their full-term siblings could benefit from better adherence to international physical activity and screen time guidelines.

Introduction

Advances in the field of neonatology have led to both an increase in infants born very preterm (<32 weeks gestational age) and an improved likelihood that these infants will survive the neonatal period [1, 2]. As these children grow through adolescence, concerns move beyond physical health to lifestyle, wellbeing and mental health that may all be compromised, can persist into adulthood and affect activities of daily living, school performance and quality of life [3-6].

Systematic reviews and meta-analyses reveal that those born very preterm or with very low birthweight generally exhibit reduced physical exercise capacity and significantly lower physical activity levels compared to their full-term peers [7-12]. Regular moderate-to-vigorous physical activity is emphasised as vital for improving exercise capacity, and also enhancing social interactions and quality of life [13]. In addition, data from longitudinal studies indicate that increased physical activity in early childhood correlates with better lung function during the growing years [14, 15].

Physical activity and sedentary behaviour including screen time are key lifestyle factors identified by the World Health Organization (WHO) that are associated with various measures of physical and mental health and quality of life [16] . High screen time, an increasing issue especially in adolescents, has been shown to be associated with health harms in general in healthy children and adolescents [17], as well as with cognitive function and behaviour in preterm-born children [18]. More generally, physical inactivity or sedentary time can have negative effects on health outcomes, whether or not physical activity recommendations are being fulfilled [19-21].

In 2021, we conducted a cross-sectional survey, FLiP ("Frühgeborenen Lungen Projekt" / Premature Infant Lung Project), of children and adolescents, born before 32 weeks of gestational age as well as their full-term siblings, primarily to assess respiratory symptoms and treatment burden in this population [22]. Children and their family were also asked about health-related quality of life [23] and lifestyle behaviours as these factors may be associated with or influence pulmonary health in our population. In the present analysis, we aimed to explore the association of very preterm birth with physical activity and screen time. Specifically, we aimed 1) to compare the levels of physical activity and screen time between the very preterm-born and their siblings, 2) to assess the association of respiratory symptoms and chronic conditions with physical activity and screen time, and 3) to identify correlates of physical activity and screen time among the very preterm-born.

Materials and methods

The cross-sectional survey FLiP recruited children born at less than 32 weeks gestation between January 2006 and December 2019, in the greater Zurich area, Switzerland. All participants were part of the Swiss Neonatal Network & Follow-Up Group (SwissNeoNet), a nationwide registry of very preterm children [24]. Of 1720 potentially eligible children, parents of 1401 children with valid postal addresses were invited by mail (May – December 2021) to complete an online survey for their preterm child as well as for one full-term sibling (at least 37 weeks gestation) aged 1 to 18 years and nearest in age to the very preterm-born child (hereafter "controls"). Families who had not completed the survey within two weeks received a reminder call or, if the phone number was not available, a second invitation letter. They could complete the survey online or on paper, in German, English, French or Italian. The present analysis included those participants who were aged at least 5 years. No other exclusion criteria were used in this analysis. The study was approved by the Ethics Committee of the Canton of Zurich, Switzerland (2020–02396). Filling out the survey was considered as providing consent. The FLiP study was powered to assess the prevalence of respiratory symptoms among children born <32 weeks gestation [22].

For external comparison with the general population, we also considered two other cohorts of children and adolescents in Switzerland. The longitudinal cohort study SOPHYA [25] ("Swiss children's Objectively measured PHYsical Activity") examined physical activity in healthy 6- to 14-year-olds in Switzerland from 2013 to 2016. SOPHYA assessed physical activity using accelerometer data, and presented summary data in their final report (table 3.1) [26], from which we extracted minutes per day in moderate-to-vigorous physical activity by 2-year age categories. The Ciao Corona study [27], a cohort study of healthy children and adolescents aged 6–17 in Switzerland during the COVID-19 pandemic, assessed physical activity and screen time via questionnaire [28] at various time points from June 2020 to July 2022 (the questions are available in the supplementary material). We extracted the questionnaires from September 2021 to correspond with the timeframe of the FLiP survey, and summarised physical activity and screen time according to the age groups available for SOPHYA.

The outcomes in this analysis were physical activity and screen time. Both were assessed in hours per day, and dichotomised according to whether they met WHO recommendations (at least 1 hour of physical activity per day or less than 2 hours of screen time per day) [16]. The exact wording of the questions regarding physical activity and screen time are presented in the appendix. Additional data collected included participants' sex and age (later stratified as 5–10 years vs ≥11

years to correspond with age categories used in lifestyle recommendations), gestational age (in weeks, range: 24–31 weeks), socioeconomic status, family unit (family identifier grouping children in the same household), chronic health conditions, presence of respiratory symptoms due to exertion or in daily activities, participation in music lessons, participation in scouts, participation in sports and need for various types of therapy. Socioeconomic status was determined as the sum of both parents' education level (range from 2, highest education, to 12, lowest education; see appendix). Chronic health conditions were categorised as heart/lung, motor or other (categorisations are provided in the appendix). To assess whether respiratory symptoms affected daily life, parents were asked several questions related to whether their child had cough or wheezing due to physical exertion in the last 12 months or whether cough or wheezing restricted their daily activities.

Demographic variables were summarised as median (range) or n (%). Outcomes were compared between very preterm-born children and their full-term siblings using linear or logistic mixed models, including age group and sex as well as family unit as a random effect. Coefficients (or odds ratios) and corresponding 95% confidence intervals (CI) were interpreted according to their possible relevance, rather than using p-values [29, 30]. To explore other potential correlates of physical activity and screen time among very preterm-born children, we used conditional inference trees [31, 32] estimated by binary recursive partitioning, using variables that we preselected for consideration in the model. To handle missing predictor values, the conditional inference trees used up to 3 surrogate splits [31]. The algorithm stopped if no split with α <0.05 could be constructed or if a subgroup had fewer than 25 participants. The statistical analysis was performed using R version 4.6.0 (2026-04-24). Mixed models were fitted using the *lmerTest* package [33] and classification trees were fitted using the ctree function from *partykit* [34]. Descriptive tables were produced with *gtsummary* [35].

Patient and public involvement

The FLiP survey used input from parents to clarify the questionnaire and to optimise survey content. A small group of very preterm-born children and adolescents as well as members of the public tested the questionnaires in a pilot phase, and could comment on patient information.

Ethical approval

The FLiP study was approved by the Ethics Committee of the Canton of Zurich, Switzerland (2020–02396). Filling out the survey was considered as providing consent.

Results

We examined data from 482 very preterm-born children and 149 of their full-term siblings aged 5 years or older (table 1). Among the very preterm-born subjects, 22% had any chronic health condition, including 9% with chronic motor conditions, 9% with chronic heart or lung conditions and 8% with other chronic health conditions. In comparison, 7% of the full-term siblings reported any chronic health condition. Median physical activity was 0.7 hours per day, regardless of subgroup (table 2, figure 1), though somewhat higher at 0.9 hours per day among control siblings younger than 11 years old. Median screen time was 1.1 hours per day among very preterm-born participants compared with 1.0 hour per day among their siblings (table 2, figure 1), although more screen time was observed among adolescents (median 2 hours per day among very preterm-born, and 2.2 hours in siblings) than among those younger than 11 years (0.9 in very preterm-born, 0.6 in siblings).

Table 1: Key characteristics of FLiP very preterm-born children and adolescents, and their control siblings, as well as age and sex for the Ciao Corona and SOPHYA cohorts. Surveyed children could have more than one chronic health condition. Socioeconomic status ranges from 2 (highest socioeconomic status, both parents having high education level) to 12 (lowest socioeconomic status, neither parent finished regular school).

Characteristic		**FLiP**		**Ciao Corona**	**SOPHYA**	
		Pretermn = 482	Controln = 149	n = 1063	n = 1320	
Age in years, mean ± SD		9.5±3.2	9.3±3.4	10.5±2.5	10.6±2.6	
Age category, n (%)	5–10 years	293 (61%)	102 (68%)	506 (48%)	677 (51%)	
	11–18 years	189 (39%)	47 (32%)	557 (52%)	643 (49%)	
Sex, n (%)	Female	221 (46%)	61 (41%)	540 (51%)	642 (49%)	
	Male	261 (54%)	86 (59%)	523 (49%)	678 (51%)	
Gestational age, n (%)	23–27 weeks	145 (30%)	0			
	28–31 weeks	337 (70%)	0			
		Full-term	0	149 (100%)		
Socioeconomic status, median (IQR)		5 (3–6)	5 (3–6)			
Any chronic health condition, n (%)		108 (22%)	10 (6.7%)			
Chronic motor condition, n (%)		42 (8.7%)	1 (0.7%)			
Chronic heart/lung condition, n (%)		44 (9.1%)	3 (2.0%)			
Other chronic health condition, n (%)		38 (7.9%)	7 (4.7%)			
Respiratory symptoms due to exertion, n (%)		98 (20%)	11 (7.4%)			
Respiratory symptpms limits daily activities, n (%)		14 (2.9%)	1 (0.7%)			
Hobbies, n (%)	Sports	337 (73%)	115 (77%)			
	Music	133 (29%)	59 (40%)			
	Scouts	49 (11%)	22 (15%)			
	Other	71 (15%)	16 (11%)			

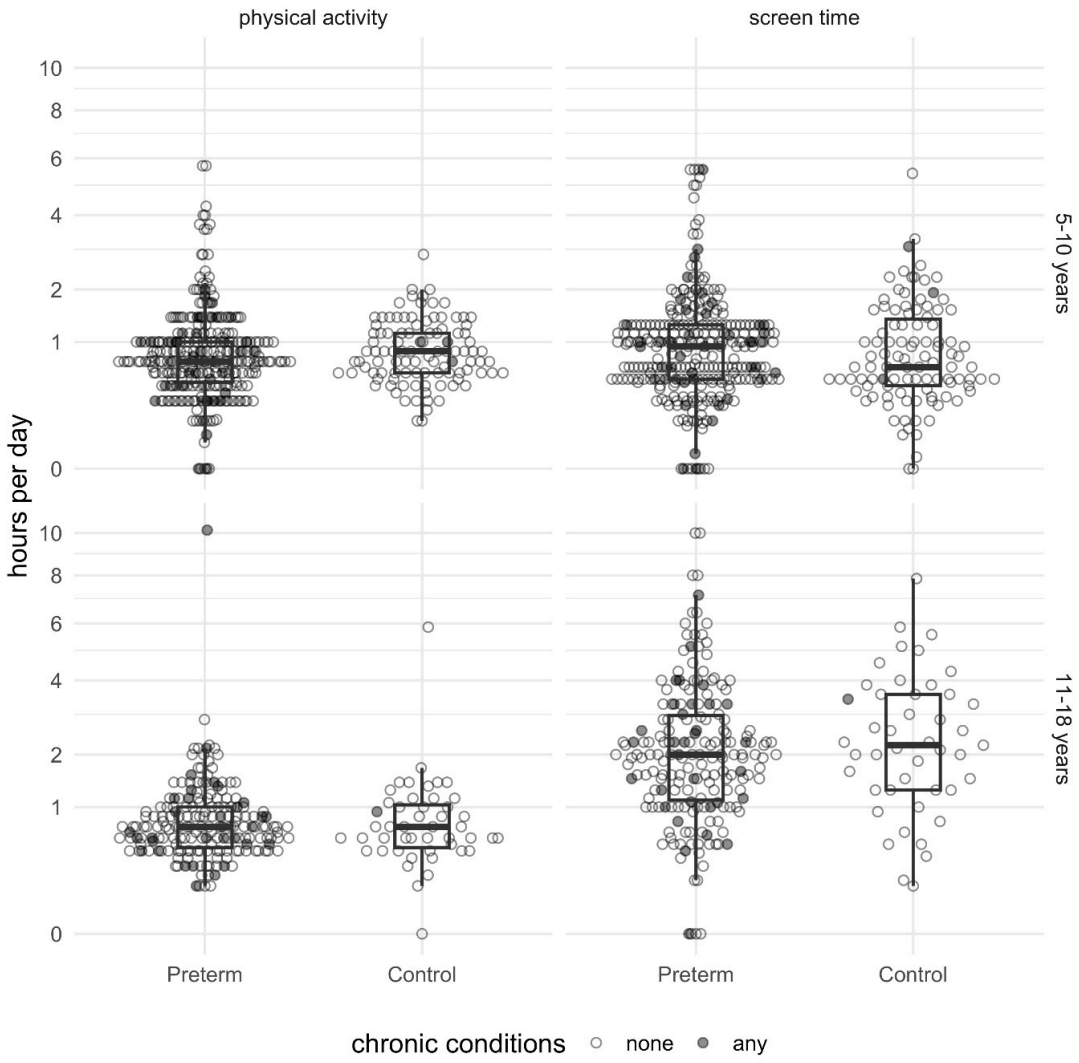


Figure 1: Physical activity and screen time (hours per day) for very preterm-born children (FLiP preterm) and their full-term siblings (FLiP control), stratified by chronic conditions. Empty circles indicate participants without chronic health conditions, while solid circles indicate those with any chronic health condition (motor, respiratory, cardiovascular or other).

Neither physical activity or screen time had meaningful differences between very preterm-born children and their full-term siblings, regardless of age group. Comparing children meeting the WHO recommendations for physical activity and screen time, we found no differences between preterm-born children and their siblings (table 2). Comparing very preterm and control siblings after adjusting for age group, sex and family unit, average physical activity in preterm children was the same as that of their control siblings (mean difference: 0.0063 hours, 95% CI: -0.10–-0.12) and screen time was 0.13 hours lower among preterm children (95% CI: -0.32–0.05). Further stratified analysis by gestational age, sex, heart or lung conditions, or motor conditions revealed similar levels of both physical activity and screen time in very preterm-born children and their siblings (tables S1, S2, S3 and S4). We also compared physical activity among very preterm-born children, by chronic motor conditions or respiratory symptoms, adjusting for age and sex, and observed only small differences between these subgroups. Those with chronic motor (heart or lung) conditions had slightly less physical activity than those without such conditions (chronic motor conditions mean difference: -0.21 hours, 95% CI: -0.49–0.07, table S5; chronic heart or lung conditions mean difference: -0.14 hours, 95% CI: -0.12–0.39, table S6), while those with respiratory symptoms had 0.07 hours less physical activity than those without respiratory symptoms (95% CI: -0.26–0.11, table S7).

Table 2: Physical activity and screen time for all participants. For physical activity and screen time in hours per day, median [interquartile range] and mean difference [confidence interval] are given. For percent of participants with at least 1 hour of physical activity per day or less than 2 hours of screen time, n (%) and odds ratio [confidence interval] are given. Results are also stratified by age group, and all comparisons of controls and preterm-born children are adjusted for family unit, sex and age.

Stratum	Group	n	Median [interquartile range]	Mean difference [confidence interval]	n (%)	Odds ratio [confidence interval]
Overall	Control	149	0.71 [0.57–1.14]		55 (37.2%)	
	Preterm	482	0.71 [0.46–1.00]	0.0063 [–0.10 to 0.12]	154 (33.5%)	0.86 [0.52–1.43]
5–10 yrs	Control	102	0.86 [0.57–1.14]		40 (39.6%)	
	Preterm	293	0.71 [0.46–1.00]	0.095 [–0.042 to 0.23]	101 (36.5%)	0.96 [0.52–1.77]
11–18 yrs	Control	47	0.71 [0.46–1.04]		15 (31.9%)	
	Preterm	189	0.71 [0.46–1.00]	–0.033 [–0.28 to 0.21]	53 (29%)	0.82 [0.34–1.98]
Overall	Control	149	1.00 [0.50–2.00]		112 (76.2%)	
	Preterm	482	1.14 [0.62–2.00]	–0.13 [–0.32 to 0.053]	360 (77.9%)	3.82 [0.82–17.89]
5–10 yrs	Control	102	0.64 [0.43–1.39]		92 (90.2%)	
	Preterm	293	0.93 [0.50–1.29]	0.017 [–0.17 to 0.20]	258 (92.5%)	2.75 [0.15–50.02]
11–18 yrs	Control	47	2.21 [1.29–3.57]		20 (44.4%)	
	Preterm	189	2.00 [1.11–2.96]	–0.084 [–0.52 to 0.36]	102 (55.7%)	1.93 [0.70–5.35]

Comparing physical activity and screen time from FLiP with those of two other comparator cohorts from Switzerland, children and adolescents from the SOPHYA and Ciao Corona studies indicated higher levels of physical activity (e.g. among 10–11 year olds, 74% of those in Ciao Corona met physical activity requirements, compared with 65% in SOPHYA, but only 29% of very preterm-born children in our sample and 39% of their siblings), with smaller differences in adolescents (e.g. among 14–16 year olds, 60% of those in Ciao Corona met physical activity requirements, compared with 22% in SOPHYA, but only 23% of very preterm-born children in our sample and 31% of their siblings) (figure 2, and supplementary table S8). No differences among the cohorts were observed with respect to screen time.

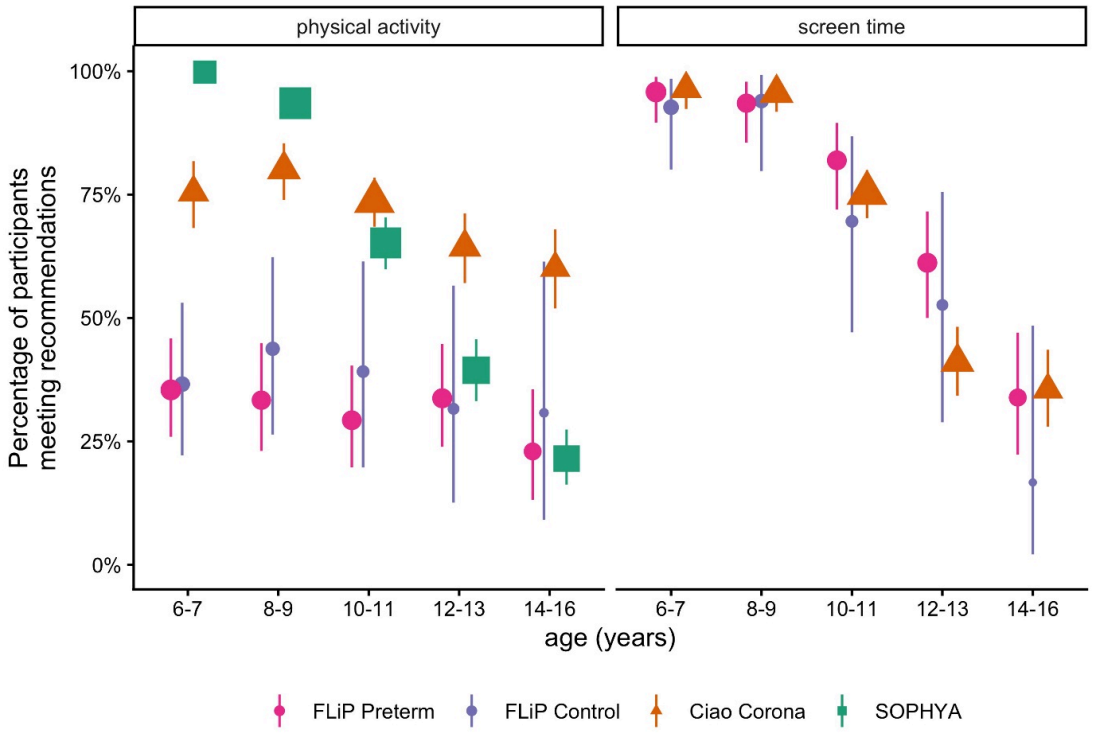


Figure 2: Comparison of proportion of subjects meeting physical activity and screen time recommendations from three cohorts: 1) FLiP very preterm-born children and their full-term siblings (questionnaire-based, 2021), 2) Ciao Corona cohort study (questionnaire-based, 2021), 3) SOPHYA (accelerometer-based, 2013–2016). The questions used in FLiP and Ciao Corona are found in the appendix, and corresponding numbers are found in table S9. Estimated sedentary or screen times were not available for SOPHYA. Clopper-Pearson confidence intervals are given and size of dots corresponds to overall sample size.

Finally, none of the variables presented in table S9 were identified as significant predictors of physical activity. For screen time, age group was the most important predictor, followed by socioeconomic status, with those aged 11 years or over having an average of 2.3 hours of screen time, compared with 0.9 hours for those aged under 11 of high socioeconomic status and 1.7 hours for those aged under 11 of low socioeconomic status (figure S1).

Discussion

We observed no difference in physical activity or screen time between very preterm-born children and their full-term siblings, even after accounting for age group, sex and family unit. But both groups had equally low adherence to WHO guidelines for physical activity, and adolescents especially were unlikely to meet guidelines for screen time. The large variability in physical activity and screen time in very preterm-born children and adolescents was not explained by the presence of respiratory symptoms or chronic conditions. In a classification tree analysis, screen time was primarily positively correlated with age and negatively with socioeconomic status. No correlates of physical activity were identified in our analysis.

Our results are in line with similar studies comparing preterm-born children and adolescents to their peers or siblings. It has previously been reported that difference in physical activity between preterm-born children and their peers is small; however, even these small differences in physical activity could be related to reduced exercise capacity or fixed or exercise-induced bronchoconstriction in the preterm [8]. A study of 11- and 15-year-old schoolchildren found only minimal differences in physical activity and sedentary time associated with gestational age [36], and a study of 9- to 11-year-old children found no difference in participation in sports activities, in hours spent playing outside or in sedentary activities between preterm-born children and their peers [37]. More generally, recent studies of physical activity or screen time in preterm-born children and adolescents show much heterogeneity (tables S10 and S11), with some studies showing differ-

ences in physical activity of preterm-born children compared to their peers, while others showed little difference. There were however few studies pertaining to screen time in this population (table S11).

Nevertheless, our sample showed lower physical activity than recommended by the WHO [16]. We therefore examined other comparative data on lifestyle in children and adolescents in Switzerland. Data from the SOPHYA study [26] indicated higher levels of physical activity in children than we have observed here in younger children, though the differences were smaller in adolescents (figure 3). SOPHYA however used accelerometry data to measure physical activity, while FLiP used questionnaires. Additionally, data from the Ciao Corona study, a cohort study of healthy children and adolescents in Switzerland during the COVID-19 pandemic, indicated higher adherence to screen time recommendations among children 5–9 years of age, even before the pandemic [28]. Using lifestyle questions from Ciao Corona taken in September 2021 to correspond to the timeframe of the FLiP survey, it appeared that they had much higher rates of fulfilling physical activity recommendations than among those in the FLiP cohort, regardless of preterm birth status. There appears, however, to be no difference between the FLiP and Ciao Corona cohorts with regards to screen time.

While the very preterm-born children in our sample had lower physical activity than in these similar studies, so did their full-term born siblings. Self-reporting of physical activity likely led to the same bias in both the very preterm-born group and in their full-term siblings, as both were filled out by the same parents. Differences in physical activity between these three cohorts are at least partly explained by different measurement methods, different wording of questions or possibly different timeframes. Differences between FLiP and the other cohorts may partially be explained by the COVID-19 pandemic-related shielding of children with bronchopulmonary dysplasia or other conditions, despite no clear signal for higher risks, and this shielding may well have included their siblings. Nevertheless, Switzerland had only a short period of school closures – from March to May 2020 – and by 2021 children and adolescents had few pandemic restrictions. While the COVID-19 pandemic may have led to increased screen time, there was no restriction on physical activity by 2021.

If the lower rates of meeting physical activity recommendations we have observed in the FLiP cohort are accurate, it may be that the repercussions of premature birth for family life beyond infancy and throughout childhood [38, 39] include siblings as well [40]. Such consequences could potentially extend to physical activity and screen time for the family as a whole. Even those previously preterm-born children without respiratory and chronic disease are highly inactive and have low fitness [41, 42]. The restriction of physical activity might be explained by overprotection, fear and/or ignorance of parents, teachers, health practitioners and social self-isolation [43]. If so, an intervention by health professionals clarifying the misconceptions related to the safety and benefits of physical activity would benefit these families including also the siblings. Alternatively, reduced exercise capacity in preterm-born children [41, 42, 44-46] could impact physical activity in the family setting.

Our analysis has several strengths. The analysis used a relatively large registry of very preterm-born children in Switzerland and included full-term siblings as a control group. Physical activity and screen time were considered both as continuous outcomes in hours per day and whether they met WHO recommendations. Family unit was included in the analysis, accounting for a number of family-specific potential confounders that may or may not have been measured (e.g. socioeconomic status, parents' physical activity, school policies, access to outdoor recreation areas, etc), as well as age group and sex. Nonetheless, there may be additional unmeasured confounding due to factors such as access to recreation. Unmeasured factors such as parental physical activity and school policies have been accounted for by adjusting for family unit. Further, Swiss schools place great emphasis on physical activity and being outdoors, in that, for example, field trips in the forest or school-wide excursions with walking between 3 and 12 kilometres, are common, even in primary school. To account for differing levels of prematurity, we stratified the analysis by gestational age. We considered a broad range of possible correlates, including respiratory symptoms, bronchopulmonary dysplasia and various chronic conditions, in a classification tree analysis, which to our knowledge has not previously been performed in this population.

Key limitations are that longitudinal data on lifestyle were not available, and not all very preterm-born participants had control siblings. No causal conclusions can be made on this cross-sectional data. We did not have information on other potentially important variables, for example,

on access to recreational facilities [47] or on parents' screen time [48], which could have provided useful information in the conditional inference tree analysis. There were also not many full-term children with chronic health conditions in the FLiP sample, which would have allowed us to further explore the associations between very preterm birth, chronic health conditions and lifestyle. Like other studies of very preterm-born children, our sample may have had selection bias [49, 50].

Clinical implications

Low physical activity and high screen time are well known, adverse behaviours in Western societies [16] that may be especially detrimental when sequelae of premature births are already present. As siblings are also affected by lifestyle within families, family-based education on the importance of physical activity and including perhaps interventions related to physical activity or screen time or both should also be considered by the child(ren)'s paediatrician. The great respect for clinicians' expertise by families of premature-born children [51] gives the clinician an important position to educate these families and provide insight into mechanisms by which and how children with premature birth may benefit from an improved lifestyle with more physical activity and less screen time. Stronger and long-term evidence of how more physical activity and less screen time influence lung growth and symptoms, exercise capacity, mental health and quality of life after premature birth would strengthen this evidence.

Conclusion

Only one-third of participants in the FLiP survey were active enough to meet physical activity recommendations, regardless of premature birth status. No differences were observed in either physical activity or screen time between very preterm-born children and their full-term siblings. Family-based interventions may help to increase physical activity and decrease screen time among very preterm-born children and their siblings.

Data sharing statement

Deidentified individual participant data (including data dictionaries) will be made available, in addition to study protocols, the statistical analysis plan, and the study forms. The data will be made available upon publication to researchers who provide a methodologically sound proposal for use in achieving the goals of the approved proposal. Proposals should be submitted to Susi Kriemler at susi.kriemlerwiget[at]uzh.ch.

Notes

Author contributions: SK, TR and GPP conceptualised and designed the study and acquired funding. SK coordinated and supervised data collection, and data were collected by GPP, MA, DB, AM, GN and ANB. SRH conceptualised and planned the analysis of lifestyle factors, conducted the statistical analysis and drafted the initial manuscript. ALS reviewed the literature to provide context for the study results. SK is responsible for the overall context as guarantor. All authors critically reviewed and revised the manuscript, and approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Use of AI: The authors declare that no generative artificial intelligence (AI) tools or AI-assisted technologies were used in the drafting, writing or creation of this manuscript.

Financial disclosure

The FLiP study received funding from LUNGE ZÜRICH (#2020–06). Giancarlo Natalucci received funding from the Family Larsson-Rosenquist Foundation. Gabriela P Peralta was supported by the European Respiratory Society Long-Term Research Fellowship 2020.

The funding sources had no role in the design and conduct of the study; collection, management, analysis and interpretation of the data; preparation, review or approval of the manuscript; and the decision to submit the manuscript for publication.

Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. M. Adams receives a salary as network coordinator for the Swiss Neonatal Network. The other authors declare no conflicts of interest related to this work.

References

1. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller A, Narwal R, et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. The Lancet. 2012 Jun;379(9832):2162-2172. doi:10.1016/S0140-6736(12)60820-4
2. Helenius K, Sjörs G, Shah PS, Modi N, Reichman B, Morisaki N, et al. Survival in Very Preterm Infants: An International Comparison of 10 National Neonatal Networks. Pediatrics. 2017 Dec 1;140(6):e20171264. doi:10.1542/peds.2017-1264
3. Saigal S, Ferro MA, Van Lieshout RJ, Schmidt LA, Morrison KM, Boyle MH. Health-Related Quality of Life Trajectories of Extremely Low Birth Weight Survivors into Adulthood. The Journal of Pediatrics. 2016 Dec;179:68-73.e1. doi:10.1016/j.jpeds.2016.08.018
4. Twilhaar ES, Wade RM, de Kieviet JF, van Goudoever JB, van Elburg RM, Oosterlaan J. Cognitive Outcomes of Children Born Extremely or Very Preterm Since the 1990s and Associated Risk Factors. JAMA Pediatrics. 2018 Apr 1;172(4):361. doi:10.1001/jamapediatrics.2017.5323
5. Anderson PJ, de Miranda DM, Albuquerque MR, Indredavik MS, Evensen KAI, Van Lieshout R, et al. Psychiatric disorders in individuals born very preterm / very low-birth weight: An individual participant data (IPD) meta-analysis. eClinicalMedicine. 2021 Dec;42:101216. doi:10.1016/j.eclinm.2021.101216
6. Kim SW, Andronis L, Seppänen A, Aubert AM, Barros H, Draper ES, et al. Health-related quality of life of children born very preterm: a multinational European cohort study. Quality of Life Research. 2023 Jan;32(1):47-58. doi:10.1007/s11136-022-03217-9
7. Edwards MO, Kotecha SJ, Lowe J, Watkins WJ, Henderson AJ, Kotecha S. Effect of preterm birth on exercise capacity: A systematic review and meta-analysis. Pediatric Pulmonology. 2015 Mar;50(3):293-301. doi:10.1002/ppul.23117
8. Lowe J, Cousins M, Kotecha SJ, Kotecha S. Physical activity outcomes following preterm birth. Paediatric Respiratory Reviews. 2017 Mar;22:76-82. doi:10.1016/j.prrv.2016.08.012
9. Engan M, Engeseth MS, Fevang S, Vollsæter M, Eide GE, Røksund OD, et al. Predicting physical activity in a national cohort of children born extremely preterm. Early Human Development. 2020 Jun;145:105037. doi:10.1016/j.earlhumdev.2020.105037
10. FitzGerald TL, Cameron KL, Albesher RA, Mentiplay BF, Lee KJ, Clark RA, et al. Strength, Motor Skills, and Physical Activity in Preschool-Aged Children Born Either at Less Than 30 Weeks of Gestation or at Term. Physical Therapy. 2021 May 4;101(5):pzab037. doi:10.1093/ptj/pzab037
11. Duke JW, Lewandowski AJ, Abman SH, Lovering AT. Physiological aspects of cardiopulmonary dysanapsis on exercise in adults born preterm. The Journal of Physiology. 2022 Feb;600(3):463-482. doi:10.1113/JP281848
12. Martínez-Zamora MD, Martín-Martínez C, Martínez-de-Quel Ó, Valenzuela PL. Influence of Preterm Birth and Low Birthweight on Physical Fitness: A Systematic Review, Meta-Analysis, and Meta-Regression. Sports Medicine. 2024 Jul;54(7):1907-1919. doi:10.1007/s40279-024-02026-z
13. Saigal S, Doyle LW. An overview of mortality and sequelae of preterm birth from infancy to adulthood. The Lancet. 2008 Jan;371(9608):261-269. doi:10.1016/S0140-6736(08)60136-1
14. Morales Mestre N, Papaleo A, Morales Hidalgo V, Caty G, Reychler G. Physical Activity Program Improves Functional Exercise Capacity and Flexibility in Extremely Preterm Children With Bronchopulmonary Dysplasia Aged 4–6 Years: A Randomized Controlled Trial. Archivos de Bronconeumología (English Edition). 2018 Dec;54(12):607-613. doi:10.1016/j.arbr.2018.05.019
15. Koch S, Peralta GP, Carsin A, Abellan A, Roda C, Torrent M, et al. Physical activity and body mass related to catch-up lung function growth in childhood: a population-based accelerated cohort study. Thorax. 2024 Aug;79(8):762-769. doi:10.1136/thorax-2022-219666
16. van der Ploeg HP, Bull FC. Invest in physical activity to protect and promote health: the 2020 WHO guidelines on physical activity and sedentary behaviour. International Journal of Behavioral Nutrition and Physical Activity. 2020 Dec;17(1):145. doi:10.1186/s12966-020-01051-1
17. Stiglic N, Viner RM. Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. BMJ Open. 2019 Jan;9(1):e023191. doi:10.1136/bmjopen-2018-023191
18. Vohr BR, McGowan EC, Bann C, Das A, Higgins R, Hintz S, et al. Association of High Screen-Time Use With School-age Cognitive, Executive Function, and Behavior Outcomes in Extremely Preterm Children. JAMA Pediatrics. 2021 Oct 1;175(10):1025. doi:10.1001/jamapediatrics.2021.2041
19. Hamilton MT, Healy GN, Dunstan DW, Zderic TW, Owen N. Too little exercise and too much sitting: Inactivity physiology and the need for new recommendations on sedentary behavior. Current Cardiovascular Risk Reports. 2008 Jul;2(4):292-298. doi:10.1007/s12170-008-0054-8
20. Muhajarine N, Katapally TR, Fuller D, Stanley KG, Rainham D. Longitudinal active living research to address physical inactivity and sedentary behaviour in children in transition from preadolescence to adolescence. BMC Public Health. 2015 Dec;15(1):495. doi:10.1186/s12889-015-1822-2
21. Biological Measures of Human Experience across the Lifespan. Springer International Publishing; 2016. doi:10.1007/978-3-319-44103-0
22. Peralta GP, Piatti R, Haile SR, Adams M, Bassler D, Moeller A, et al. Respiratory morbidity in preschool and school-age children born very preterm and its association with parents' health-related quality of life and family functioning. European Journal of Pediatrics. 2023 Jan 6;182(3):1201-1210. doi:10.1007/s00431-022-04783-3
23. Haile SR, Peralta GP, Adams M, Bharadwaj AN, Bassler D, Moeller A, et al. Health-related quality of life in children and adolescents born very preterm and its correlates: a cross-sectional study. BMJ Paediatrics Open. 2024 Oct;8(1):e002885. doi:10.1136/bmjpo-2024-002885
24. Adams M, Natalucci G, Bassler D. An overview of the Swiss Neonatal Network & Follow-up Group (SwissNeoNet). Pediatric Medicine. 2023 Feb;6:7-7. doi:10.21037/pm-21-76
25. Bringolf-Isler B, De Hoogh K, Schindler C, Kayser B, Suggs LS, Dössegger A, et al. Sedentary Behaviour in Swiss Children and Adolescents: Disentangling Associations with the Perceived and Objectively Measured Environment. International Journal of Environmental Research and Public Health. 2018 May 4;15(5):918. doi:10.3390/ijerph15050918
26. Bringolf-Isler B, Probst-Hensch N, Kayser B, Suggs S. Schlussbericht zur SOPHYA-Studie. 2016.
27. Ulyte A, Radtke T, Abela IA, Haile SR, Braun J, Jung R, et al. Seroprevalence and immunity of SARS-CoV-2 infection in children and adolescents in schools in Switzerland: design for a longitudinal, school-based prospective cohort study. International Journal of Public Health. 2020 Dec;65(9):1549-1557. doi:10.1007/s00038-020-01495-z
28. Haile SR, Gunz S, Peralta GP, Ulytė A, Raineri A, Rueegg S, et al. Health-Related Quality of Life and Adherence to Physical Activity and Screen Time Recommendations in Schoolchildren: Longitudinal Cohort Ciao Corona. International Journal of Public Health. 2023 Jul 19;68:1606033. doi:10.3389/ijph.2023.1606033
29. Sedgwick P. Clinical significance versus statistical significance. BMJ. 2014 Mar 14;348(mar14 11):g2130-g2130. doi:10.1136/bmj.g2130
30. Altman N, Krzywinski M. P values and the search for significance. Nature Methods. 2017 Jan;14(1):3-4. doi:10.1038/nmeth.4120
31. Hothorn T, Hornik K, Zeileis A. Unbiased Recursive Partitioning: A Conditional Inference Framework. Journal of Computational and Graphical Statistics. 2006 Sep;15(3):651-674. doi:10.1198/106186006X133933
32. Venkatasubramaniam A, Wolfson J, Mitchell N, Barnes T, JaKa M, French S. Decision trees in epidemiological research. Emerging Themes in Epidemiology. 2017 Sep 20;14(1):11. doi:10.1186/s12982-017-0064-4
33. Kuznetsova A, Brockhoff PB, Christensen RHB. lmerTest Package: Tests in Linear Mixed Effects Models. Journal of Statistical Software. 2017;82(13). doi:10.18637/jss.v082.i13
34. Hothorn T, Zeileis A. partykit: A modular toolkit for recursive partytioning in R. J Mach Learn Res. 2015;16:3905–9.
35. Sjoberg D, Whiting K, Curry M, Lavery J, Larmarange J. Reproducible Summary Tables with the gtsummary Package. The R Journal. 2021;13(1):570. doi:10.32614/RJ-2021-053
36. Lowe J, Watkins WJ, Kotecha SJ, Edwards MO, Henderson AJ, Kotecha S. Physical Activity in School-Age Children Born Preterm. The Journal of Pediatrics. 2015 Apr;166(4):877-883. doi:10.1016/j.jpeds.2014.12.013
37. Nordvall-Lassen M, Hegaard HK, Obel C, Lindhard MS, Hedegaard M, Henriksen TB. Leisure time physical activity in 9- to 11-year-old children born moderately preterm: a cohort study. BMC Pediatrics. 2018 Dec;18(1):163. doi:10.1186/s12887-018-1141-8
38. Treyvaud K, Doyle LW, Lee KJ, Roberts G, Cheong JLY, Inder TE, et al. Family functioning, burden and parenting stress 2years after very preterm birth. Early Human Development. 2011 Jun;87(6):427-431. doi:10.1016/j.earlhumdev.2011.03.008
39. Starke V, Diderholm B, Heyman M, Blomqvist YT. Being parents of extremely preterm children, from a long-term perspective: A qualitative study of parents' experiences. Early Human Development. 2023 Aug;183:105819. doi:10.1016/j.earlhumdev.2023.105819
40. Silva W, Virtanen E, Kajantie E, Sebert S. Cognition, mental health and quality of life amongst siblings of preterm born children: A systematic review. Acta Paediatrica. 2024 Apr;113(4):654-669. doi:10.1111/apa.17105
41. Clemm HH, Vollsæter M, Røksund OD, Markestad T, Halvorsen T. Adolescents who were born extremely preterm demonstrate modest decreases in exercise capacity. Acta Paediatrica. 2015 Nov;104(11):1174-1181. doi:10.1111/apa.13080
42. Duke JW, Lovering AT. Respiratory and cardiopulmonary limitations to aerobic exercise capacity in adults born preterm. Journal of Applied Physiology. 2020 Oct 1;129(4):718-724. doi:10.1152/japplphysiol.00419.2020
43. Bar-Or O. Children and Exercise in a Clinical Context—An Overview. In: Comprehensive Manuals in Pediatrics. Springer New York; 1983. p. 66-87. doi:10.1007/978-1-4612-5593-2_2
44. Smith LJ, van Asperen PP, McKay KO, Selvadurai H, Fitzgerald DA. Reduced Exercise Capacity in Children Born Very Preterm. Pediatrics. 2008 Aug 1;122(2):e287-e293. doi:10.1542/peds.2007-3657
45. O'Dea CA, Beaven ML, Wilson AC, Smith EF, Maiorana A, Simpson SJ. Preterm birth and exercise capacity: what do we currently know?. Frontiers in Pediatrics. 2023 Oct 6;11:1222731. doi:10.3389/fped.2023.1222731
46. Fitzgerald HT, Halvorsen T, Engan M, Li S, Selvadurai H. Exercise capacity and the psychosocial effect in preterm born infants – Should we do more?. Paediatric Respiratory Reviews. 2025 Sep;55:10-16. doi:10.1016/j.prrv.2025.01.001
47. Sterdt E, Liersch S, Walter U. Correlates of physical activity of children and adolescents: A systematic review of reviews. Health Educ J. 2013;13. doi:10.1177/0017896912469577
48. Ashton JJ, Beattie RM. Screen time in children and adolescents: is there evidence to guide parents and policy?. The Lancet Child & Adolescent Health. 2019 May;3(5):292-294. doi:10.1016/S2352-4642(19)30062-8
49. van der Pal S, Steinhof M, Grevinga M, Wolke D, Verrips GE. Quality of life of adults born very preterm or very low birth weight: A systematic review. Acta Paediatrica. 2020 Oct;109(10):1974-1988. doi:10.1111/apa.15249
50. Bolbocean C, van der Pal S, van Buuren S, Anderson PJ, Bartmann P, Baumann N, et al. Health-Related Quality-of-Life Outcomes of Very Preterm or Very Low Birth Weight Adults: Evidence From an Individual Participant Data Meta-Analysis. PharmacoEconomics. 2023 Jan;41(1):93-105. doi:10.1007/s40273-022-01201-2

51. Coulston F, Spittle A, McDonald C, Remedios L, Toovey R, Cheong J, et al. “We are a unique breed”: strategies to enhance physical activity participation for preschool-aged children born extremely preterm, a mixed-methods study. Disability and Rehabilitation. 2023 Nov 20;45(24):4111-4121. doi:10.1080/09638288.2022.2147226

Supplementary Material

Formulation of Questions: FLiP

- `sports_duration`: How many hours does your child spend **per week** on physical activity that causes at least some sweating or heavy breathing? (Include also physical education in school)
- `edevices_weekday`: How many hours **per day** does your child currently spend using electronic devices on a typical weekday? (Not including schoolwork and homework.)
- `edevices_weekend`: How many hours **per day** does your child currently spend using electronic devices on a typical weekend day? Not including schoolwork and homework.
- `hobbies_...`: Does your child regularly (at least every two weeks) participate in the following activities? If your child does not participate in these activities, please select "No." (Multiple answers are possible)
  - Yes, sports activities such as gymnastics, ballet, dance, tennis, basketball, soccer, etc.
  - Yes, music lessons, musical activities, theater, circus, etc.
  - Yes, other activities such as Scouts, CEVI, Blauring, Jungwacht, etc.
  - Yes, other: _____
  - no

Physical activity and screentime were then computed as follows:

- `physical_activity = sports_duration / 7`
- `screentime = (edevices_weekday * 5 + edevices_weekend * 2) / 7`

chronic disease categories

- **motor**: joint disorders (e.g. arthritis), cerebral palsy, any use of wheelchair, walker, crutches, orthotics
- **heart** / **lung**: asthma, cystic fibrosis, congenital heart defect, heart disease
- **misc**: diabetes mellitus, inflammatory bowel disease, epilepsy, ADHD, depression / anxiety, neurodermatitis / excema, high blood pressure, deafness / hard of hearing
- **not counted**: celiac, lactose intolerance, other allergies

socio-economic status (SES)

Sum of "What is the highest educational qualification of the mother?" and "What is the highest educational qualification of the father?" as defined by SwissNeoNet.

1. University

2. University of applied science, technical college, higher level job training, college of education, university entrance qualification (Matura or Berufsmatura)
3. Apprenticeship or secondary school diploma
4. Job requiring minimal training
5. Regular school without job training
6. No education, or unfinished regular school

Formulation of Questions: Ciao Corona (September 2021)

- `pa_wday`: How many hours of sports or other physical activity **per day** (which caused sweating or increased breathing) does your son/daughter CURRENTLY participate in on a typical weekday (Monday through Friday)? Please include school sports.
- `pa_wend`: How many hours of sports or other physical activities **per day** (which caused sweating or more breathing) does your son/daughter CURRENTLY do on a typical weekend day (Saturday, Sunday)?
- `media_freet_wday`: How many hours **per day** does your son/daughter CURRENTLY spend using electronic devices (e.g. TV, cell phone, computer, Playstation, Xbox) in their free time on a typical weekday (Monday to Friday)?
- `media_freet_wday`: How many hours **per day** does your son/daughter CURRENTLY spend using electronic devices (e.g. TV, cell phone, computer, Playstation, Xbox) in their free time on a typical weekend day (Saturday and Sunday)?

Physical activity and screentime were then computed as follows:

- `physical_activity = (pa_wday * 5 + pa_wend * 2) / 7`
- `screentime = (media_freet_wday * 5 + media_freet_wday * 2) / 7`

Supplementary Tables and Figures

Table S1: stratified analysis for physical activity in hours per day. Median [IQR] and mean difference (confidence interval) are given.

stratum	group	n	median [IQR]	mean difference
gest age	Control	149	0.71 [0.57 - 1.14]	
	23-27	145	0.71 [0.46 - 1.07]	0.0112 [-0.15 to 0.17]
	28-31	337	0.71 [0.43 - 1.00]	0.0047 [-0.11 to 0.12]
girls	Control	63	0.64 [0.54 - 0.86]	
	Preterm	221	0.71 [0.43 - 1.00]	0.13 [-0.08 to 0.34]
boys	Control	86	0.86 [0.57 - 1.29]	
	Preterm	261	0.79 [0.50 - 1.14]	-0.0081 [-0.13 to 0.11]
no heart/lung cond.	Control	146	0.71 [0.57 - 1.14]	
	Preterm	438	0.71 [0.46 - 1.00]	0.011 [-0.10 to 0.12]
heart/lung cond.	Control	3	0.93 [0.82 - 0.96]	
	Preterm	44	0.82 [0.43 - 1.14]	(insufficient sample size)
no motor cond.	Control	148	0.71 [0.57 - 1.14]	
	Preterm	440	0.71 [0.49 - 1.00]	0.017 [-0.098 to 0.13]
motor cond.	Control	1	1.00 [1.00 - 1.00]	
	Preterm	42	0.57 [0.41 - 1.00]	(insufficient sample size)

Table S2: stratified analysis for screentime in hours per day. Median [IQR] and mean difference (confidence interval) are given.

stratum	group	n	median [IQR]	mean difference
gest age	Control	149	1.00 [0.50 - 2.00]	
	23-27	145	1.00 [0.57 - 2.00]	-0.09 [-0.36 to 0.179]
	28-31	337	1.14 [0.64 - 2.00]	-0.15 [-0.35 to 0.049]
girls	Control	63	1.00 [0.50 - 2.11]	
	Preterm	221	1.21 [0.64 - 1.93]	0.0011 [-0.21 to 0.21]
boys	Control	86	1.00 [0.50 - 1.98]	
	Preterm	261	1.10 [0.55 - 2.00]	-0.11 [-0.37 to 0.14]
no heart/lung cond.	Control	146	1.00 [0.50 - 2.00]	
	Preterm	438	1.14 [0.64 - 2.00]	-0.15 [-0.34 to 0.05]
heart/lung cond.	Control	3	1.93 [1.21 - 2.68]	
	Preterm	44	1.09 [0.50 - 2.36]	(insufficient sample size)
no motor cond.	Control	148	1.00 [0.50 - 2.00]	
	Preterm	440	1.14 [0.57 - 2.00]	-0.10 [-0.29 to 0.082]
motor cond.	Control	1	3.07 [3.07 - 3.07]	
	Preterm	42	1.00 [0.64 - 1.93]	(insufficient sample size)

Table S3: stratified analysis for physical activity in hours per day. Number meeting guidelines (percent) and odds ratio (confidence interval) are given.

stratum	group	n	meeting guidelines (pct)	odds ratio
gest age	Control	148	55 (37.2%)	
	23-27	137	49 (35.8%)	1.04 [0.54 to 1.99]
	28-31	323	105 (32.5%)	0.80 [0.47 to 1.37]
girls	Control	63	14 (22.2%)	
	Preterm	221	56 (26.3%)	1.37 [0.62 to 2.99]
boys	Control	86	41 (48.2%)	
	Preterm	261	98 (39.7%)	0.66 [0.35 to 1.22]
no heart/lung cond.	Control	146	54 (37.2%)	
	Preterm	438	137 (32.9%)	0.83 [0.50 to 1.38]
heart/lung cond.	Control	3	1 (33.3%)	
	Preterm	44	17 (38.6%)	(insufficient sample size)
no motor cond.	Control	148	54 (36.7%)	
	Preterm	440	143 (33.7%)	0.89 [0.54 to 1.46]
motor cond.	Control	1	1 (100%)	
	Preterm	42	11 (30.6%)	(insufficient sample size)

Table S4: stratified analysis for screentime in hours per day. Number meeting guidelines (percent) and odds ratio (confidence interval) are given.

stratum	group	n	meeting guidelines (pct)	odds ratio
gest age	Control	147	112 (76.2%)	
	23-27	139	111 (79.9%)	4.26 [0.41 to 43.93]
	28-31	323	249 (77.1%)	3.72 [0.74 to 18.56]
girls	Control	63	45 (73.8%)	
	Preterm	221	170 (79.4%)	3.20 [0.21 to 49.75]
boys	Control	86	67 (77.9%)	
	Preterm	261	190 (76.6%)	0.27 [0.013 to 5.37]
no heart/lung cond.	Control	146	110 (76.4%)	
	Preterm	438	330 (78.9%)	7.72 [1.36 to 43.94]
heart/lung cond.	Control	3	2 (66.7%)	
	Preterm	44	30 (68.2%)	(insufficient sample size)
no motor cond.	Control	148	112 (76.7%)	
	Preterm	440	331 (77.9%)	1.77 [0.36 to 8.81]
motor cond.	Control	1	0 (0%)	
	Preterm	42	29 (78.4%)	(insufficient sample size)

Table S5: model for PA, by chronic motor conditions

Characteristic	**Beta**	**95% CI**	**p-value**
chronic_motor	-0.21	-0.49, 0.07	0.14
age_group			
5-10	—	—	
11-18	-0.07	-0.23, 0.08	0.4
sex			
girls	—	—	
boys	0.11	-0.04, 0.26	0.14

Abbreviation: CI = Confidence Interval

Table S6: model for PA, by chronic heart or lung conditions

Characteristic	**Beta**	**95% CI**	**p-value**
chronic_heartlung	0.14	-0.12, 0.39	0.3
age_group			
5-10	—	—	
11-18	-0.08	-0.23, 0.08	0.3
sex			
girls	—	—	
boys	0.11	-0.04, 0.26	0.2

Abbreviation: CI = Confidence Interval

Table S7: model for PA, by presence of respiratory symptoms due to exertion

Characteristic	Beta	95% CI	p-value
resp_symptoms			
none	—	—	
resp symptoms due to exertion	-0.07	-0.26, 0.11	0.4
age_group			
5-10	—	—	
11-18	-0.07	-0.23, 0.08	0.4
sex			
girls	—	—	
boys	0.11	-0.04, 0.26	0.2

Abbreviation: CI = Confidence Interval

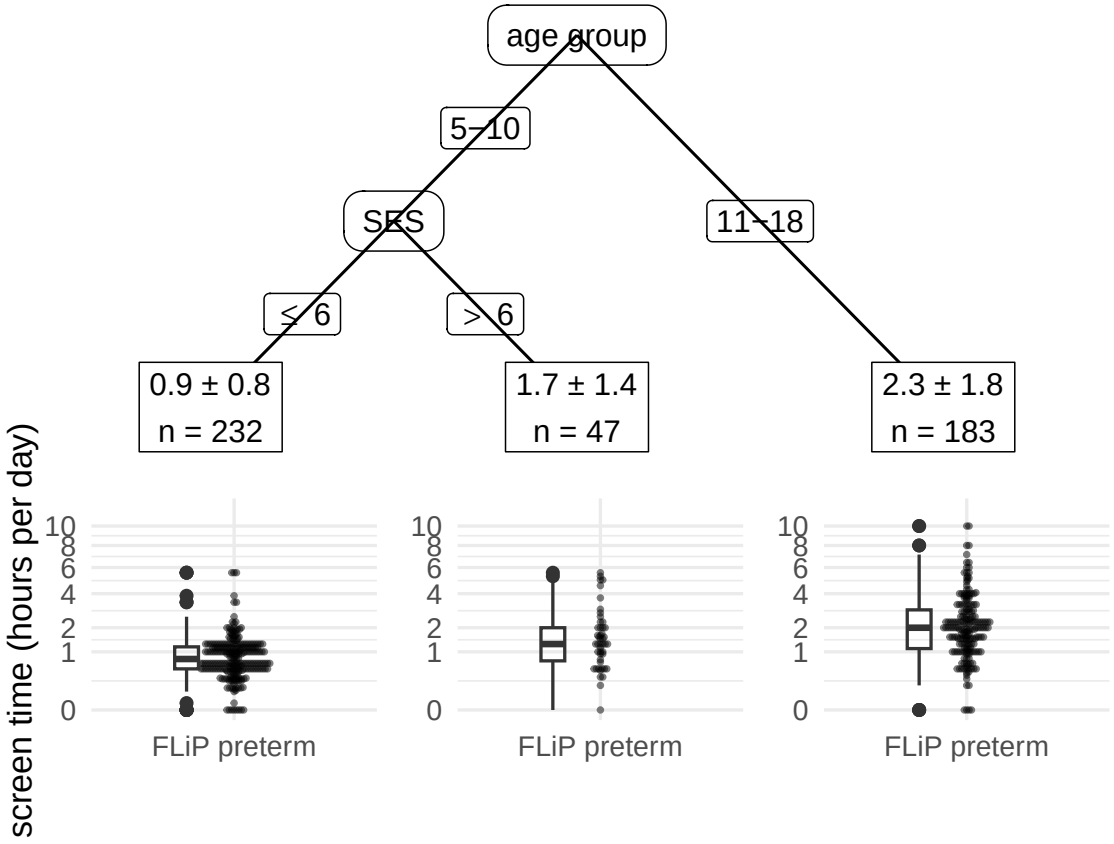


Figure S1: Results of conditional inference tree model for screen time. For each identified subgroup, mean ± standard deviation and sample size are given. SES indicates socio-economic status, assessed using parental education and ranging from 2 (both parents have university education) to 12 (neither parent finished regular school).

Table S8: Comparison of physical activity and screen time from 3 cohorts: 1) FLiP very preterm born children and their fullterm born siblings (questionnaire-based, 2021), 2) Ciao Corona cohort study (questionnaire-based, 2021), 3) SOPHYA (accelometer-based, 2013-2016), as shown in Figure 3. Clopper-Pearson confidence intervals are given. Estimated sedentary or screen time were not available for SOPHYA.

group	physical activity	screen time
age 6-7		
FLiP Preterm	35.4% [25.9 to 45.8] (n=96)	95.8% [89.6 to 98.8] (n=95)
FLiP Control	36.6% [22.1 to 53.1] (n=41)	92.7% [80.1 to 98.5] (n=41)
Ciao Corona	75.4% [68.2 to 81.8] (n=167)	96.4% [92.3 to 98.7] (n=167)
SOPHYA	99.8% [97.8 to 100.0] (n=163)	(not available)
age 8-9		
FLiP Preterm	33.3% [23.1 to 44.9] (n=78)	93.5% [85.5 to 97.9] (n=77)
FLiP Control	43.8% [26.4 to 62.3] (n=32)	93.9% [79.8 to 99.3] (n=33)
Ciao Corona	80.1% [73.9 to 85.4] (n=201)	95.6% [91.8 to 98.0] (n=203)
SOPHYA	93.5% [90.4 to 95.8] (n=355)	(not available)
age 10-11		
FLiP Preterm	29.3% [19.7 to 40.4] (n=82)	81.9% [72.0 to 89.5] (n=83)
FLiP Control	39.1% [19.7 to 61.5] (n=23)	69.6% [47.1 to 86.8] (n=23)
Ciao Corona	73.7% [68.5 to 78.4] (n=319)	75.3% [70.2 to 79.9] (n=320)
SOPHYA	65.2% [59.9 to 70.4] (n=331)	(not available)
age 12-13		
FLiP Preterm	33.7% [23.9 to 44.7] (n=86)	61.2% [50.0 to 71.6] (n=85)
FLiP Control	31.6% [12.6 to 56.6] (n=19)	52.6% [28.9 to 75.6] (n=19)
Ciao Corona	64.4% [57.1 to 71.2] (n=188)	41.1% [34.2 to 48.2] (n=202)
SOPHYA	39.4% [33.1 to 45.7] (n=247)	(not available)
age 14-16		
FLiP Preterm	23.0% [13.2 to 35.5] (n=61)	33.9% [22.3 to 47.0] (n=62)
FLiP Control	30.8% [9.1 to 61.4] (n=13)	16.7% [2.1 to 48.4] (n=12)
Ciao Corona	60.1% [51.9 to 67.9] (n=153)	35.5% [28.0 to 43.6] (n=155)
SOPHYA	21.5% [16.2 to 27.4] (n=224)	(not available)

Table S9: potential correlates of physical activity or screen time included in conditional inference tree analysis

Characteristic	N = 482[1]
age_group	
5-10	293 (61%)
11-18	189 (39%)
sex (M)	261 (54%)
GA (<28 weeks)	145 (30%)
birthweight (g)	1150 (890, 1450)
Swiss nationality	391 (84%)
SES (2 high - 12 low)	5 (3, 6)
BPD (moderate to severe)	61 (13%)
resp symptoms due to exertion	98 (20%)
resp symptoms limit daily activities	14 (2.9%)
number of chronic conditions	
0	410 (85%)
1	60 (12%)
2	12 (2.5%)
chronic motor condition	42 (8.7%)
chronic heart/lung condition	44 (9.1%)
other chronic condition	38 (7.9%)
cerebral palsy (any severity)	42 (8.7%)
hobbies: sports	337 (73%)
hobbies: music, theater	133 (29%)
hobbies: scouts	49 (11%)
hobbies: other	71 (15%)

[1]n (%); Median (Q1, Q3)

Table S10: Recent studies in PA in children and adolescents

Study	Title	Participants	Age	Endpoints	Results	Conclusions
Smith 2008	Reduced exercise capacity in children born very preterm.	Preterm: N=126, <32 weeks and birthweight <1kg ; Control: N=34, ≥37 weeks	10 y (mean)	Exercise capacity	The exercise capacity was approximately half that of the control group. No significant difference in the distance walked in the 6-minute walk test.	Findings demonstrated significant impairment in exercise capacity despite evidence of only mild small-airway obstruction and gas trapping.
Lowe 2015	Physical activity in school-age children born preterm	Preterm: N= 876, 25-36 weeks ; Control: N=13164, 37-43 weeks	11 and 15 y	PA, Moderate to vigorous intensity physical activity (MVPA), sedentary behaviour	No statistically significant differences in total PA, MVPA or sedentary behavior.	Physical activity was similar for the different gestational groups and did not correlate with lung spirometry. Physical activity does not appear to be limited in preterm-born children despite lung function deficits noted in childhood.
Clemm 2015	Adolescents who were born extremely preterm demonstrate modest decreases in exercise capacity	Preterm: N=35, ≤28 weeks or birthweight ≤1kg ; Control: N=22, ≥37 weeks	10-18 y	Exercise capacity	Mean peak oxygen consumption (peak VO2) was 42.3 vs 45.3 mL/kg/min in the control group.	Exercise capacity was modestly reduced in adolescents born extremely preterm, but the values were considered normal in most participants.
Lowe 2016	Physical activity and sedentary behavior in preterm-born 7 year old children	Preterm: N=473, 25-36 weeks ; Control: N=5949, 37-43 weeks	7 y	PA, MVPA, sedentary behaviour	MVPA (mean difference -9 minutes per day). No differences were found for Total PA or sedentary behavior.	Boys born at 32 weeks' gestation took part in less MVPA than their term-born peers at 7 years of age. The differences were modest, but equated to a reduction of over 1 hour per week. Since PA levels have been shown to decline during childhood and adolescence, this vulnerable group deserves further surveillance.
Pikel 2017	Impact of prematurity on exercise capacity and agility of children and youth aged 8 to 18	Preterm: N=178, <37 weeks ; Control: N=218, ≥37 weeks	8-18 y	Exercise capacity, agility	Aerobic and the majority of anaerobic tests performed worse ($p < 0.05$) than controls.	Prematurity, especially extreme prematurity, diminishes exercise capacity and agility on the long-term scale.
Nordvall-Lassen 2018	Leisure time physical activity in 9 to 11 year old children born moderately preterm: a cohort study	Preterm: N=158, 32-36 weeks ; Control: N=4783, ≥37 weeks	9-11 y	PA, playing outside	No statistically significant difference in PA and hours per weeks playing outside.	Nine to eleven year old moderately preterm children participated in sports activities outside school to a similar extent as their peers and engaged in outdoor activities and sedentary activities for the same duration of time per week as their peers born at term.
Mestre 2018	Physical Activity Program Improves Functional Exercise Capacity and Flexibility in Extremely Preterm Children With Bronchopulmonary Dysplasia Aged 4-6 Years: A Randomized Controlled Trial	Preterm: N=20, <37 weeks and moderate BPD ; Control: N/A	4-6 y	Exercise tolerance, exercise capacity and flexibility	Statistical and clinical improvements in exercise tolerance, exercise capacity and flexibility	This 4-week exercise programme was beneficial for BPD preterm children.

Table S10: Recent studies in PA in children and adolescents *(continued)*

Study	Title	Participants	Age	Endpoints	Results	Conclusions
Spiegler 2019	Prospective Study of Physical Activity of Preterm Born Children from Age 5 to 14 Years	Preterm: N=4032, 24-36 weeks ; Control: N=47119, ≥37 weeks	5, 7, 11 and 14 y	PA	No statistically significant difference in PA.	Prematurity was associated with a small or no difference in physical activity at each time point.
Engan 2019	Comparison of physical activity and body composition in a cohort of children born extremely preterm or with extremely low birth weight to matched term-born controls: a follow-up study	Preterm: N=57, <28 weeks or birthweight <1kg ; Control: N=57, ≥37 weeks, with a birthweight >3 kg	mean age =11.6 y	PA, physical endurance, proficiency in sports, muscle mass, fat mass, bone mineral density	PA more than 3 days per week = 22% (vs 44%), lower physical endurance, poorer proficiency, less vigorous in exercise, lower values for muscle mass (mean= 0.9 kg), total bone mineral density (mean=0.30 units) and fat mass ratio (mean=0.14 units).	The preterm born children were less physically active, had signs of an unfavourable body composition with less muscle mass and lower bone mineral density than the controls. The association between physical activity and the measures of body composition was weaker in the group of preterm born.
Svedenkrans 2020	Physical Activity in 6.5-Year-Old Children Born Extremely Preterm	Preterm: N=71, <27 weeks ; Control: N=87, ≥37 weeks	6.5 y	PA	Time per day of PA: for boys 22 minutes less than controls, for girls there was no difference.	Children born extremely preterm exhibit lower levels of PA, which may be a contributory factor in the development of cardiovascular diseases as adults.
Engan 2020	Predicting physical activity in a national cohort of children born extremely preterm	Preterm: N=232, <28 weeks and/or birthweight <1kg ; Control: N=57, ≥37 weeks and birthweight >3kg	11 y	PA	Fewer exercise events per week, less engaged in team sports, lower endurance, lower sports proficiency, less vigorous during PA than term-born children ($p < 0.05$).	Preterm children are less physically active than term-born.
Fitzgerald 2021	Strength, motor skills, and physical activity (PA) in preschool-age children born either at less than 30 weeks of gestation or at term	Preterm: N= 123, <30 weeks ; Control: N=128, birthweight ≥2500 g	4-5 y	PA, stationary behaviour, muscle strength, motor skills.	Muscle strength (mean difference -0.60 kg), motor skill (mean difference -2.17), PA (mean difference -41 minutes per day), stationary behavior (mean difference + 33 minutes per day).	Preschool-aged children born <30 weeks had poorer muscle strength, motor skills and PA levels than term-born children. Preterm born children had more stationary behaviour than term-born children.
Brylka 2021	Physical Activity, Mental Health, and Well-Being in Very Pre-Term and Term Born Adolescents: An Individual Participant Data Meta-Analysis of Two Accelerometry Studies	Preterm: N=85, ≤32 weeks ; Control: N=3196, ≥37 weeks	mean age =14 y	PA	No statistically significant difference in PA.	Overall, the effect-sizes were small and the associations did not differ significantly between very preterm and term born adolescents.
Kosiecz 2021	Evaluation of physical and cardiorespiratory fitness in 7-year-old prematurely born children – preliminary study	Preterm: N=30, <37 weeks ; Control: N=30, ≥37 weeks	7 y	PA, cardiorespiratory fitness	Lower level of physical and cardiorespiratory fitness. Low physical fitness level: 43% vs 3% in the control group.	Prematurely born children present lower physical and cardiorespiratory fitness than children born on time.

Table S10: Recent studies in PA in children and adolescents *(continued)*

Study	Title	Participants	Age	Endpoints	Results	Conclusions
Tamai 2021	Sports participation and preterm birth: a nationwide birth cohort in Japan	Preterm: N=2375, $\geq$ 25 weeks ; Control: N=44183, $\geq$37 weeks	7, 10, 15 y	PA	Less likely to participate in sports clubs at 7, 10, and 15 years old than controls.	Findings suggest that preterm birth is associated with less participation in organized sports during childhood and adolescence than full-term birth.
Roeper 2023	Physical activity levels, pulmonary function, and MRI in children born extremely preterm: a comparison between children with and without bronchopulmonary dysplasia	Preterm: N=45, <28 weeks, 28 with BPD ; Control: (no info)	7-9 y	PA	There were no differences in any physical activity outcomes by BPD status.	School-aged children born extremely preterm have similar PA levels to their peers, regardless of history of BPD. MRI and PFT measures suggestive of gas trapping and/or airflow obstruction are associated with lower physical activity levels.
Martinez-Zamora 2023	Influence of preterm birth on physical fitness in early childhood	Preterm: N=98, >30 weeks ; Control: N=74, >38 weeks	3-5 y	PA, strength, cardiorespiratory fitness, agility, flexibility, balance	No differences in PA level, but handgrip strength (-13.95%), muscle strength (-12.67%), agility (-14.9%), cardiorespiratory fitness (-12.73%) flexibility (-17.04%), compared to controls.	Despite no significant differences in PA levels, preterm children showed an overall poorer physical fitness compared to controls.
Praprotnik 2023	Physical fitness trajectories from childhood to adolescence in extremely preterm children: a longitudinal cohort study	Preterm: N=50, <28 weeks (N=19 with BPD) ; Control: N=30, $\geq$37 weeks	7-14 y (yearly)	Physical fitness index (PFI)	Preterm children with BPD had significantly and persistently lower PFI than preterm children without BPD and term-born children. They not improved their score towards the years.	Extreme prematurity per se is not a risk factor for lower PF at school age. However, if complicated by BPD, PF is significantly and sustainably reduced.
O'Dea 2023	Preterm birth and exercise capacity: what do we currently know? (Narrative literature review).	Preterm: N/A ; Control: N/A	<18 y	Pulmonary outcomes using cardiopulmonary exercise testing	Disrupted lung development, significant structural and functional lung disease, increased respiratory symptoms. Expiratory flow limitation and an altered ventilatory response during exercise.	Risk factors for reduced exercise capacity in those born preterm remain poorly understood. However, utilizing cardiopulmonary exercise testing will enhance our understanding of the role exercise may play.
Cameron 2025	Community participation, physical activity, and quality of life for children born very preterm	Preterm: N=45, <30 weeks ; Control: N=89, $\geq$37 weeks	4-5 y	PA	Environmental helpfulness led to an increase in PA (+3 min per day, +90 steps per day). The increase in PA was slightly stronger for preterm born children.	Improving environmental helpfulness may improve physical activity.
Fitzgerald 2025	Exercise capacity and the psychosocial effect in preterm born infants – should we do more? (Literature review)	Preterm: N/A ; Control: N/A	Children	Exercise capacity	Very preterm delivery is associated with an adverse lung function trajectory throughout life.	Increased physical activity in childhood may mitigate against social marginalisation and improve exercise capacity in children born very preterm.

Table S11: Recent studies in ST in children and adolescents

Study	Title	Participants	Age	Endpoints	Results	Conclusions
Fitzgerald 2021	Strength, motor skills, and physical activity (PA) in preschool-ages children born either at less than 30 weeks of gestation or at term	Preterm: N= 123, <30 weeks ; Control: N=128, birthweight $\geq$2500 g	4 - 5 y	ST	Screen time (mean difference +21 minutes per day).	Preterm born children had more screen behavior than term-born children.
Vohr 2021	Association of high screen-time use with school-age cognitive, executive function and behavior outcomes in extremely preterm children.	Preterm: N=414, <28 weeks ; Control: N/A	6-7 y	ST	57% had high screen time and 64% had a television/computer in their bedroom. Screen time was associated with lower IQ, deficits in executive functions. A screen in the bedroom was associated with an increase in inhibition and hyperactivity/impulsivity.	High screen time contributes to adverse cognitive, executive function, and behavior outcomes among preterm children.
Iyer 2025	Preterm-born children, screen time, and spectacle wear in the Longitudinal Preterm Outcome Project: a cohort study	Preterm: N=2082, <32-36 weeks ; Control: N=767, >38 weeks	5 and 13-16 y	ST, spectacle wear	At age 5, prevalences of spectacle wear were 7.7% vs 3.2%, among controls. The risk of spectacle wear decreased by 7% for each additional week of gestational age. In adolescence no statistically significant difference.	Prematurity significantly increased risk of spectacle wear at age 5, but not significantly at adolescence. At that age, the prevalence of spectacle wear were generally higher. We found no evidence for an association of screen time preterm birth with spectacle wear, and neither an impact of screentime on such an association.