

EFFECT OF INCREASED SCREEN TIME IN CHILDREN WITH AGE BETWEEN 2-6 YEARS IN TERMS OF INCREASED RISK OF BEING OVERWEIGHT

DR SAMIA UMAR¹, DR RIZWAN WASEEM², DR MUHAMMAD WASIM SALIM³, DR WAQAS ALI⁴, DR MUHAMMAD ADIL KHAN⁵, DR ZOHA NIAZ⁶

¹POSTGRADUATE RESIDENT PEADIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: SAMIAUMARAMIR@GMAIL.COM

²HEAD OF DEPARTMENT PEADIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: DR@RIZWANWASEEM@YAHOO.COM

³FELLOW NEONATOLOGIST, SERVICES HOSPITAL, LAHORE, EMAIL:
MUHAMMADWAXIM0@GMAIL.COM

⁴ASSOCIATE PROFESSOR PAEDIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: DRWAQASALI9@GMAIL.COM

⁵SENIOR REGISTRAR PAEDIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: ADILKHAN8711@GMAIL.COM

⁶POSTGRADUATE RESIDENT PAEDIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: ZOHA AHMAD.ZS@GMAIL.COM

CORRESPONDING AUTHOR:

DR SAMIA UMAR

POSTGRADUATE RESIDENT PEADIATRICS, GHURKI TRUST TEACHING HOSPITAL, LAHORE
EMAIL: SAMIAUMARAMIR@GMAIL.COM

PUBLISHED:- 15 DECEMBER 2025

Abstract

Background: Excessive screen exposure has become increasingly common among young children and may contribute to sedentary behavior and unhealthy weight gain.

Objective: To determine the association between increased screen time and overweight status among children aged 2–6 years.

Methodology: A comparative cross-sectional study is conducted in the Department of Paediatrics, Ghurki Trust Teaching Hospital, Lahore from July 2025 to October 2025. A total of 60 children aged 2–6 years are included through non-probability consecutive sampling and divided into two groups: 30 overweight children and 30 normal-weight children. Weight and height are measured to calculate body mass index, while daily screen time and duration of outdoor games are obtained from parents or guardians.

Results: The mean daily screen time is higher among overweight children compared with normal-weight children, 5.12 ± 1.43 versus 3.18 ± 1.21 hours/day, respectively. Screen time exceeding 4 hours/day is observed in 19 (63.3%) overweight children compared with 8 (26.7%) normal-weight children, showing a statistically significant difference ($p=0.009$). Mean outdoor activity is lower among overweight children, 1.18 ± 0.62 hours/day, compared with 2.05 ± 0.81 hours/day among normal-weight children ($p<0.001$).

Conclusion: Increased screen time is significantly associated with overweight status among children aged 2–6 years. Overweight children have longer daily screen exposure and lower outdoor activity compared with normal-weight children.

Keywords: Screen time, overweight, children, obesity, sedentary behavior, preschool children, outdoor activity.

INTRODUCTION

Childhood obesity is defined as having a BMI at or above 95th percentile for age and sex, and childhood overweight as BMI at or above 85th percentile but less than 95th percentile for age and sex [1]. Over the last 20 years, overweight and obesity have become an epidemic in preschool children and in more than 40 million children worldwide are overweight or obese [2]. Childhood obesity has shown an eightfold increase in the 5-19 year age group and a doubling in the 2-4 year age group in the last 40 years around the world [3]. Furthermore, approximately 34% of children living in low-income families are obese, while approximately 19% of children living in high-income families are obese [4].

Childhood and adolescent obesity are linked to a variety of adult health problems such as obesity, hypertension, diabetes, asthma, sleep apnea, dyslipidemia and more. Therefore, it is essential to recognise emerging risk factors for obesity that occur in this age group that could be targeted by early interventions to prevent adverse health outcomes in adulthood [5]. Childhood obesity is a complex problem that has been attributed to a variety of factors such as family history and genetics, diet, physical activity, screen time and sleep habits [6]. Screen time has become one of the most prevalent factors to sedentary time with respect to sedentary behavior. Screen time may act directly on energy balance as it is a relatively low energy demanding activity [7]. ≥ 4 h per day was considered high screen time [8]. In a study in India, Kaul et al. (2023) [9] found the screen time to be significantly higher in overweight children compared to the normal weight children per day and per week. Similarly, Bekhwani et al., 2022 [8] Pakistan observed that the frequency of screen time exposure >4 hrs/day was reported to be significantly high among overweight/obese children as compared to non-obese children (61.9% vs 26.6%, p -value <0.001). Given that the above studies indicate that increased screen time is a key component of overweight or obesity in children, there needs to be an optimal limit for the amount of time that children spend on screens. But prior to its advocacy and depriving children of screen time, which is a source of information and increases children's IQ levels as well, it is imperative to note that another study has given different findings, where Malik et al. (2020) [10] in Indonesia reported that the frequency of long screen time was higher in obese children than in non-obese children (87.1% vs. 85.7%; p -value=0.805), but the difference was not significant.

OBJECTIVE

The purpose of this study was to compare the frequency of over 4 hours of screen time exposure/day in overweight and normal weight children.

METHODOLOGY

It's a cross-sectional survey conducted at the Department of Paediatrics, Ghurki Trust Teaching Hospital, Lahore from July 2025 to October 2025. The sample size was determined as 60 children, which includes 30 children in each group, at 80% power of test at the 0.05 level of significance, with the expected frequency of the screen time of >4 hours/day being 61.9% and 26.6% in overweight and normal-weight children, respectively [8]. Data was collected using non-probability consecutive sampling techniques. Children of both sexes aged 2-6 years who presented to the Department of Paediatrics were included. Children with eating disorders or pre-existing obesity, developmental delay (e.g. cerebral palsy, autism), recent change in physical activity or dietary change, or any condition that needs urgent treatment for infection/surgery were excluded.

DATA COLLECTION

60 eligible children who presented to the outpatient department of Paediatrics, Ghurki Trust Teaching Hospital, Lahore for routine evaluation were enrolled after getting written informed consent from their parents/guardians. Demographic and medical history was obtained for each participant in detail.

Standard measurements were used for weight and height and BMI was calculated. Children were considered overweight using the operational definition and split into two groups:

Group A: Overweight children ($n = 30$)

Group B: Normal weight children ($n = 30$)

Parental/guardian reporting of daily screen time was used to determine daily screen time. All parental information were collected by the resident and anthropometric measurements were made by the resident to ensure consistency of data collection. Exclusion criteria were used to control for potential confounding variables.

DATA ANALYSIS

The data was input and analyzed with SPSS version 26.0. Means $\pm$ standard deviations were reported for numerical variables such as age, daily screen time, outdoor games duration, and BMI. The categorical variables gender, residence, weight group, and screen time >4 hours per day were displayed as frequencies and percentages. A chi-square test was used to compare the frequency of screen time >4 hours/day among the overweight and normal weight children. The level of statistical significance was p -value ≤ 0.05 . Screen time >4 hours/day was additionally categorized by age, gender, amount of time spent outdoors playing games, and place of residence to evaluate for

potential effect modifiers. The chi-square test was used after stratification and a p-value of ≤ 0.05 was considered statistically significant.

RESULTS

Data were collected from 60 patients, mean age of overweight children was 4.32 ± 1.11 years compared with 4.18 ± 1.06 years among normal-weight children, with no statistically significant difference between the groups ($p=0.619$). In the overweight group, 17 (56.7%) children were male and 13 (43.3%) were female, while in the normal-weight group, 16 (53.3%) were male and 14 (46.7%) were female ($p=0.795$). Urban residence was reported in 21 (70.0%) overweight and 20 (66.7%) normal-weight children, whereas 9 (30.0%) and 10 (33.3%), respectively, belonged to rural areas ($p=0.781$). The mean BMI was significantly higher among overweight children, 18.91 ± 1.24 kg/m², compared with 15.42 ± 1.08 kg/m² among normal-weight children ($p<0.001$).

Table 1. Baseline Characteristics of Study Participants

Variable	Overweight Children (n=30)	Normal-Weight Children (n=30)	p-value
Age, years	4.32 ± 1.11	4.18 ± 1.06	0.619
Male	17 (56.7%)	16 (53.3%)	0.795
Female	13 (43.3%)	14 (46.7%)	
Urban residence	21 (70.0%)	20 (66.7%)	0.781
Rural residence	9 (30.0%)	10 (33.3%)	
BMI, kg/m ²	18.91 ± 1.24	15.42 ± 1.08	<0.001

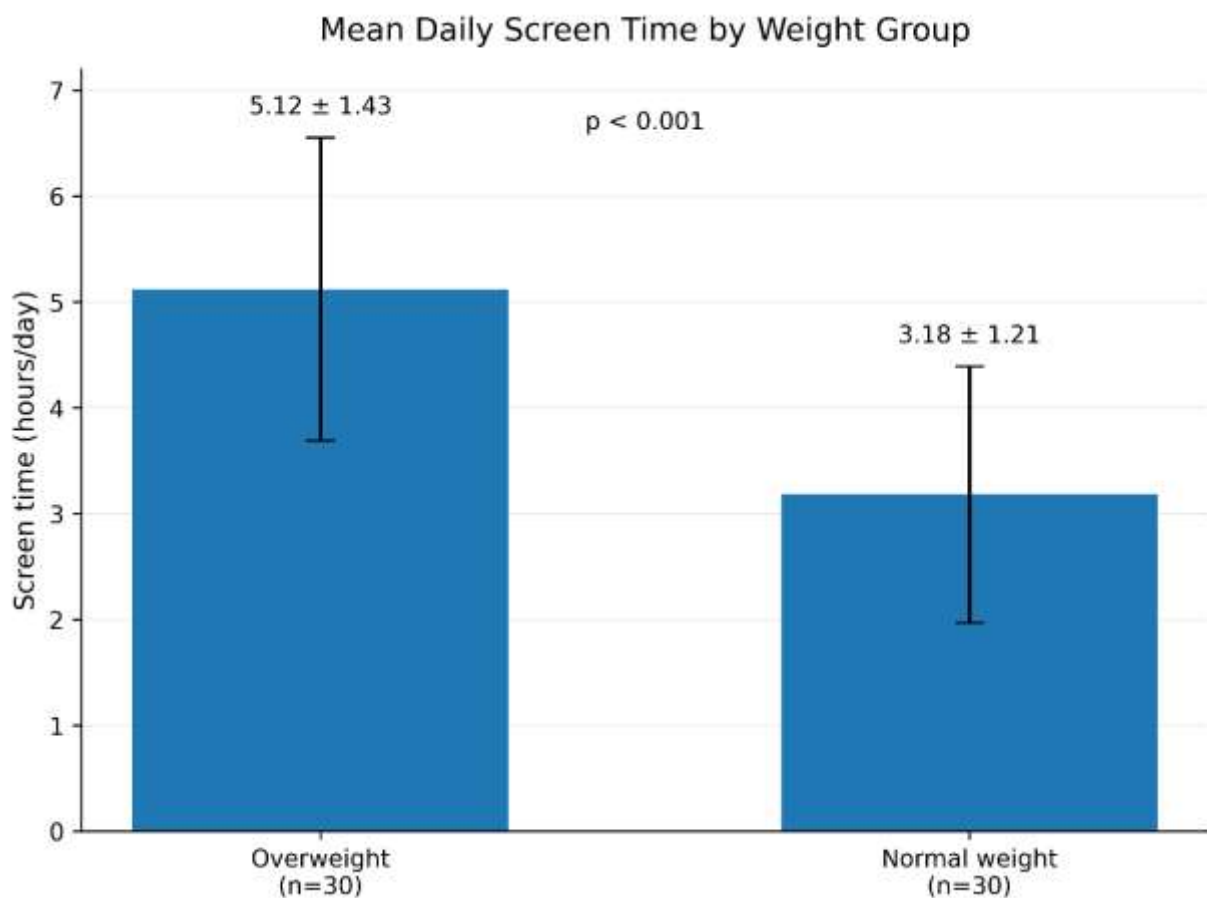


Figure 1. Mean Daily Screen Time by Weight Group

The mean daily screen time was significantly higher among overweight children at 5.12 ± 1.43 hours/day compared with 3.18 ± 1.21 hours/day among normal-weight children ($p < 0.001$). Screen time exceeding 4 hours/day was reported in 19 (63.3%) overweight children compared with 8 (26.7%) normal-weight children, while screen time of 4 hours/day or less was observed in 11 (36.7%) and 22 (73.3%) children, respectively. The difference in the frequency of screen time >4 hours/day was statistically significant ($p = 0.009$).

Table 2. Comparison of Screen Time and Outdoor Activity Between Groups

Variable	Overweight Children (n=30)	Normal-Weight Children (n=30)	p-value
Daily screen time, hours	5.12 ± 1.43	3.18 ± 1.21	<0.001
Screen time >4 hours/day	19 (63.3%)	8 (26.7%)	0.009
Screen time ≤ 4 hours/day	11 (36.7%)	22 (73.3%)	
Outdoor games, hours/day	1.18 ± 0.62	2.05 ± 0.81	<0.001

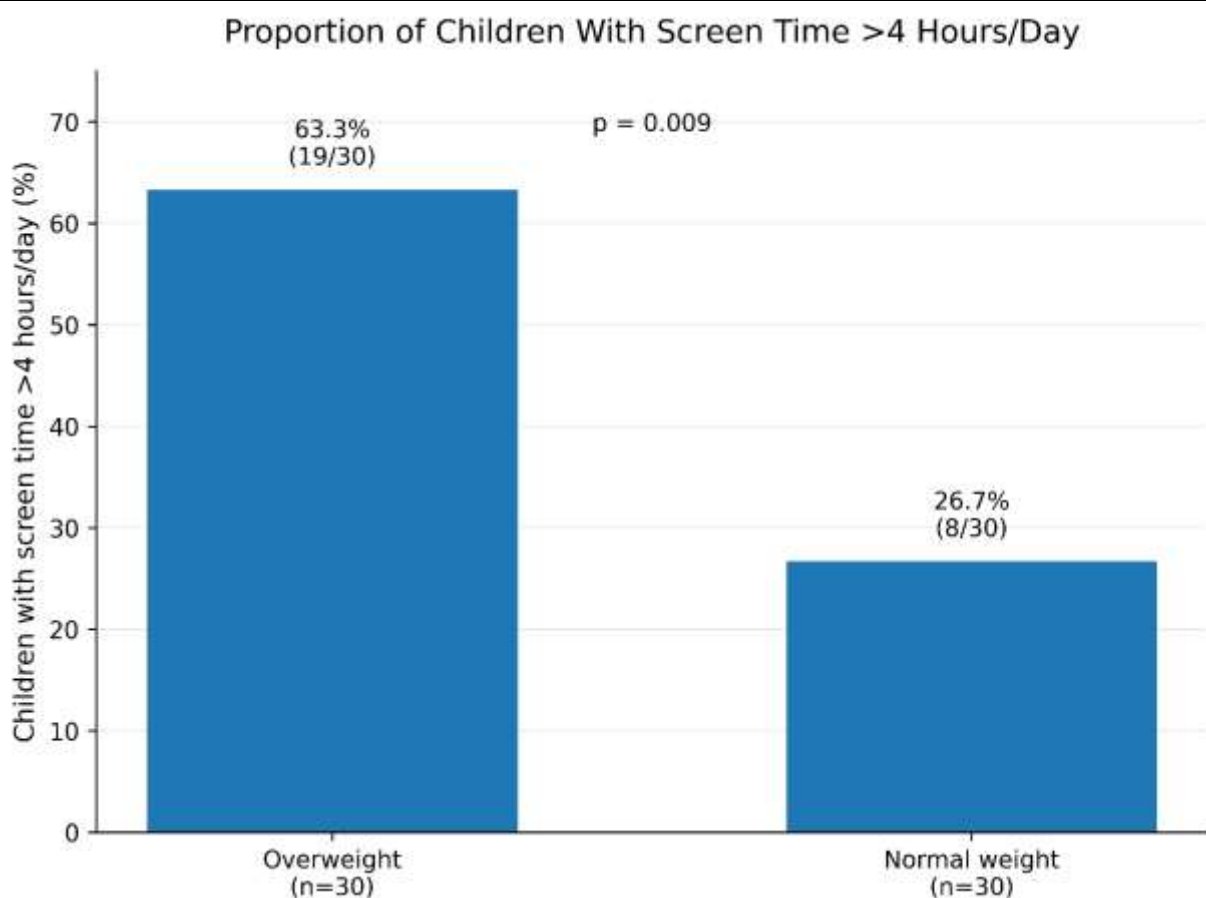


Figure 2. Proportion of Children with Screen Time >4 Hours/Day

Among children aged 2–4 years, screen time >4 hours/day was reported in 10/16 (62.5%) overweight children and 4/17 (23.5%) normal-weight children, showing a statistically significant difference ($p = 0.024$). Among children aged 5–6 years, the corresponding frequencies were 9/14 (64.3%) and 4/13 (30.8%), respectively, but the difference was not statistically significant ($p = 0.082$). Among males, prolonged screen time was observed in 11/17 (64.7%) overweight and 5/16 (31.3%) normal-weight children ($p = 0.055$), while among females it was observed in 8/13 (61.5%) and 3/14 (21.4%), respectively, with a statistically significant difference ($p = 0.034$).

Table 3. Stratified Comparison of Screen Time >4 Hours/Day Between Overweight and Normal-Weight Children

Stratification Variable	Overweight n/N (%)	Normal Weight n/N (%)	p-value
Age 2–4 years	10/16 (62.5%)	4/17 (23.5%)	0.024
Age 5–6 years	9/14 (64.3%)	4/13 (30.8%)	0.082
Male	11/17 (64.7%)	5/16 (31.3%)	0.055
Female	8/13 (61.5%)	3/14 (21.4%)	0.034
Outdoor games <2 hours/day	15/20 (75.0%)	5/12 (41.7%)	0.059
Outdoor games ≥2 hours/day	4/10 (40.0%)	3/18 (16.7%)	0.172
Urban residence	14/21 (66.7%)	6/20 (30.0%)	0.019
Rural residence	5/9 (55.6%)	2/10 (20.0%)	0.109

Among overweight children, 3 (10.0%) had daily screen time of ≤2 hours, 8 (26.7%) had screen time of 2.1–4 hours, and 19 (63.3%) had screen time exceeding 4 hours/day. In comparison, among normal-weight children, 8 (26.7%) had screen time of ≤2 hours, 14 (46.6%) had screen time of 2.1–4 hours, and 8 (26.7%) had screen time exceeding 4 hours/day.

Table 4. Distribution of Daily Screen Time Categories According to Weight Group

Daily Screen Time	Overweight Children (n=30)	Normal-Weight Children (n=30)	p-value
≤2 hours/day	3 (10.0%)	8 (26.7%)	
2.1–4 hours/day	8 (26.7%)	14 (46.6%)	
>4 hours/day	19 (63.3%)	8 (26.7%)	0.015

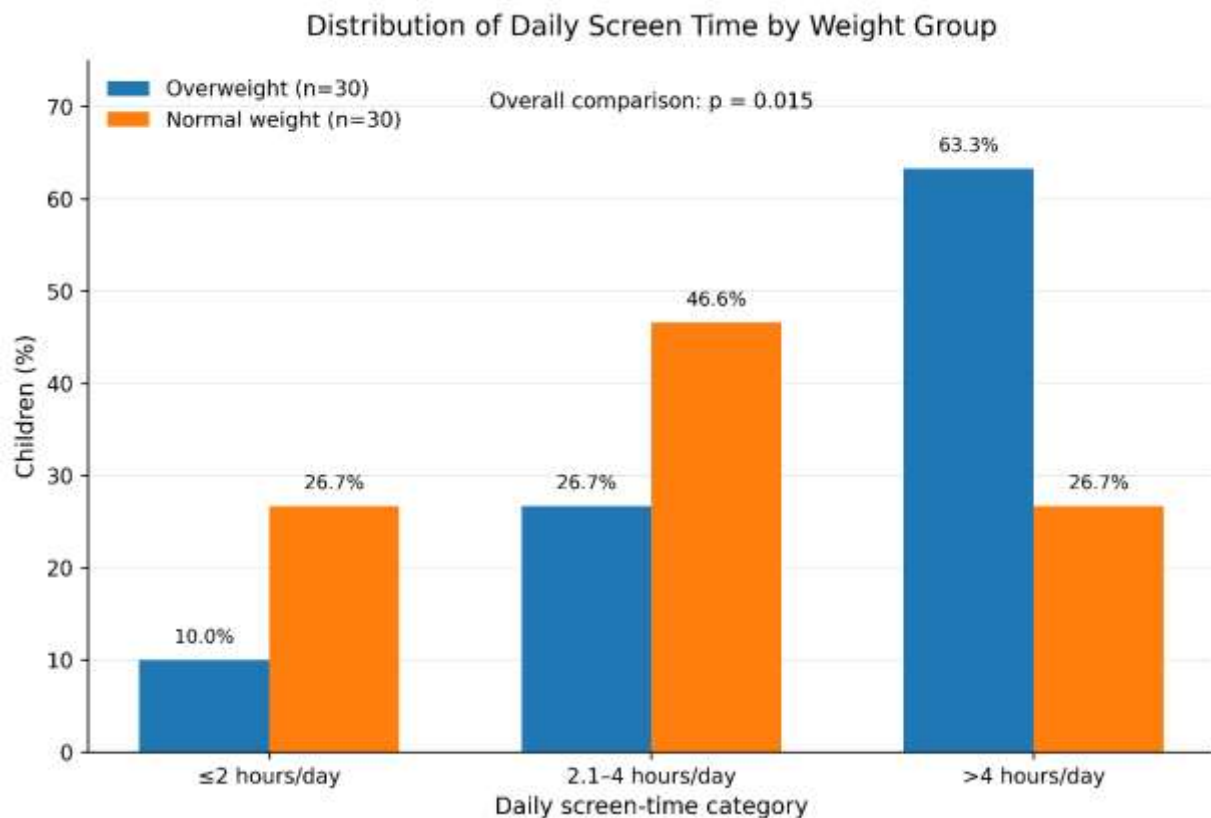


Figure 3. Distribution of Daily Screen Time by Weight Group

DISCUSSION

The current study examines the relationship between greater screen time and overweight in children from 2–6 years of age. The mean of screen time consumption per day is significantly higher for overweight children than for normal-weight children with 5.12 ± 1.43 hours/day and 3.18 ± 1.21 hours/day respectively, according to the results obtained here. Moreover, the percentage of the overweight children exposed to more than 4 hours/day of screen time is 63.3%, while 26.7% of normal-weight children are exposed to more than 4 hours/day of screen time. The results indicate a possible significant relationship between long duration of screen time and overweight in early childhood. The results of the present study, however, do only reflect an association and do not prove that increased screen time leads to overweight, as the study is cross-sectional. Previous studies with preschool children have yielded similar results. Mendoza et al. used nationally representative U.S. data to evaluate children between 2 and 5 years of age, and concluded that exposure to TV/video exposure for more than 2 hours a day is related to an increased prevalence of overweight or overweight risk in children in this age group. A similar study found that children who watched more television were also more overweight [11]. Similarly, a cross sectional study in children aged 2 to 6 years found positive relationship between watching TV on weekdays and BMI z score and that eating in front of TV and displacing physical activity may be factors in this relationship [12]. The findings are similar to the increased screen time among overweight children reported in this study. Longitudinal studies also have shown an association between screen and adiposity. Higher exposure to screens during 2–3 years of age was correlated with higher adiposity at 3–5 years of age in the GUSTO cohort, especially in boys. In boys, more than one hour of screen time was related to higher BMI and skinfold thickness, while in girls, the relationships were inconsistent [13]. Another study from a similar cohort looked at associations with increased total screen time during early childhood to increased abdominal subcutaneous adipose tissue (ASA) during childhood and found stronger relationships in some sex and ethnic subgroups [14]. The current study's findings are reinforced by the longitudinal results, which demonstrate a biological and behavioural plausibility of the association found, as well as indicate that the relationship can be different among the various groups of children. The association between screen exposure and overweight status could be due to several behavioral pathways. Extended screen time can lead to less active play, more sedentary time, more snack consumption during screen time, and children being exposed to food advertising. The use of screens, especially in the evening, can in addition impact sleep habits. These mechanisms represent possible mechanisms from previous research and are not directly observed in this study and should not be considered as mechanisms in this dataset. The current WHO guidelines focus on reducing sedentary screen time and encouraging physical activity during early childhood: less than 1 hour a day – less is better – for children aged 2 years, and less than 3–4 hours a day for children aged 5–11 years. Current WHO guidelines emphasize reducing sedentary screen time and increasing physical activity during early childhood: less than 1 hour a day – less is better – for children aged 2 years, and less than 3–4 hours a day for those aged 5–11 years.

There were some differences in stratified results, based on age, gender, outdoor activity, and residence. These sub-group results are however to be interpreted with caution due to the small numbers of children in each of these sub-groups [16]. Statistically significant association in one subgroup, non-significant association in another does not necessarily indicate modification of the relationship by age, gender or residence. Further studies with multivariable analysis are needed to establish if these are independent factors that affect the relationship between screen time and overweight [17,18]. The present study has certain limitations. Screen time is self-reported by parents and could be subject to recall or reporting bias. The sample was small and from a single tertiary care hospital and may not be generalizable. The cross-sectional design also does not allow for time sequence or causality to be determined. In addition, although some confounding factors are excluded and stratified, potentially important factors like detailed dietary intake, sleep duration, parental BMI and socioeconomic factors are not well assessed. However, these limitations, the study demonstrates a strong relationship between screen time and overweight status among children 2–6 years of age and calls for further studies with larger prospective samples that would include screen time in conjunction with dietary intakes, sleep, and objectively assessed physical activity levels.

CONCLUSION

Finally, there is a significant association between excess screen time and being overweight in children 2–6 years old. Children who are overweight have longer daily screen time and are more likely to spend more time than 4 hours a day using screen time than normal weight children. Overweight children also are less likely to be physically active. These results confirm the value of reducing the amount of screen time and promoting active play for children in early childhood. But with this cross-sectional design, the study only finds an association and not a causality between more screen time and overweight.

REFERENCES

1. Yusuf ZI, Dongarwar D, Yusuf RA, Bell M, Harris T, Salihu HM. Social determinants of overweight and obesity among children in the United States. *Int J Matern Child Health AIDS*. 2019;9(1):22-33.
2. Reyna-Vargas ME, Parmar A, Lefebvre DL, Azad MB, Becker AB, Turvey SE, et al. Longitudinal associations between sleep habits, screen time and overweight, obesity in preschool children. *Nat Sci Sleep* 2022;14(1):1237-47.
3. Mittal M, Jain V. Management of obesity and its complications in children and adolescents. *Indian J Pediatr* 2021;88(12):1222-34.
4. Chen T, Lin J, Lin Y, Xu L, Lu D, Li F, et al. Effects of aerobic exercise and resistance exercise on physical indexes and cardiovascular risk factors in obese and overweight school-age children: a systematic review and meta-analysis. *PLoS One* 2021;16(9):e0257150.
5. Bakour C, Mansuri F, Johns-Rejano C, Crozier M, Wilson R, Sappenfield W. Association between screen time and obesity in US adolescents: a cross-sectional analysis using national survey of children's health 2016–2017. *Plos One* 2022;17(12):e0278490.
6. Atwah A, Koshak E, Shalabi MS, Alsulami A, Alsaedi AS, Alharbi O, et al. Childhood obesity may be linked to feeding habits and screen time. *Cureus* 2023;15(12):e4050933.
7. Must A, Eliasziw M, Stanish H, Curtin C, Bandini LG, Bowling A. Passive and social screen time in children with autism and in association with obesity. *Front Pediatr* 2023;11(1):1198033.
8. Bekhwani AR, Khan M. Various risk factors of overweight and obesity among children aged 5-16 years. *J Coll Physicians Surg Pak* 2022;9(79):42-9.
9. Kaul A, Bansal N, Sharma P, Aneja S, Mahato MP. Association of screen time usage and physical activity with overweight and obesity among school-going children in Uttar Pradesh. *Cureus* 2023;15(10):1-8.
10. Malik SM, Rahmadi FA, Wistiani W. Influence of screen time and sleep duration on obesity in early adolescents. *Paediatr Indones* 2020;60(3):154-9.
11. Chang RY, Chen TL, Yeh CC, Chen CH, Wang QW, Toungh T, Liao CC. Risk of Obesity Among Children Aged 2-6 Years Who Had Prolonged Screen Time in Taiwan: A Nationwide Cross-Sectional Study. *Clin Epidemiol*. 2023 Feb 13;15:165-176. doi: 10.2147/CLEP.S382956. PMID: 36817560; PMCID: PMC9936874.
12. Liu Y, Li W, Wen LM, He G. Social Media as a Driver of Obesity in Children and Adolescents (Aged 6-18 Years): It Is Time for Regulatory Action. *J Med Internet Res*. 2026 Aug 10;28:e95678. doi: 10.2196/95678. PMID: 42574737; PMCID: PMC13456531.
13. Zong XN, Li H, Zhang YQ; Coordinating Study Group on the Physical Growth and Development of Children of Nine Cities. [Risk factors of simple obesity in preschool children in nine cities of China]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2022 Jan 10;43(1):50-57. Chinese. doi: 10.3760/cma.j.cn112338-20210407-00284. PMID: 35130652.
14. Watanabe E, Lee JS, Mori K, Kawakubo K. Clustering patterns of obesity-related multiple lifestyle behaviours and their associations with overweight and family environments: a cross-sectional study in Japanese preschool children. *BMJ Open*. 2016 Nov 4;6(11):e012773. doi: 10.1136/bmjopen-2016-012773. PMID: 27815299; PMCID: PMC5128936.
15. Zong B, Li L, Cui Y, Shi W. Effects of outdoor activity time, screen time, and family socioeconomic status on physical health of preschool children. *Front Public Health*. 2024 Aug 7;12:1434936. doi: 10.3389/fpubh.2024.1434936. PMID: 39171316; PMCID: PMC11337874.
16. Crider K, Williams J, Qi YP, Gutman J, Yeung L, Mai C, Finkelstein J, Mehta S, Pons-Duran C, Menéndez C, Moraleta C, Rogers L, Daniels K, Green P. Folic acid supplementation and malaria susceptibility and severity among people taking antifolate antimalarial drugs in endemic areas. *Cochrane Database Syst Rev*. 2022 Feb 1;2(2022):CD014217. doi: 10.1002/14651858.CD014217. Update in: *Cochrane Database Syst Rev*. 2026 Feb 18;2:CD014217. doi: 10.1002/14651858.CD014217.pub2. PMID: 36321557; PMCID: PMC8805585.
17. Alqahtani YA. Knowledge, Attitude and Practices of Parents Towards Obesity in Children in Aseer Region, Southern of Saudi Arabia. *Int J Gen Med*. 2025 Aug 12;18:4391-4401. doi: 10.2147/IJGM.S520120. PMID: 40831605; PMCID: PMC12358315.
18. Thorat S, Deshmukh R, Adhya S. Age-specific effects of screen time on overweight/obese: a structural equation model of children and adolescents in Western Maharashtra, India. *Front Public Health*. 2026 Jan 2;13:1682181. doi: 10.3389/fpubh.2025.1682181. PMID: 41551284; PMCID: PMC12808472.