
Screen-based sedentary behaviours among a nationally representative sample of youth: are Canadian kids couch potatoes?

S. T. Leatherdale, PhD (1); R. Ahmed, PhD (1,2)

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Abstract

Purpose: To determine the percentage of Canadian youth meeting screen-time guidelines and to identify characteristics associated with different screen-time behaviours.

Methods: Using nationally representative data collected from the 2008/2009 Youth Smoking Survey (YSS), we analyzed three screen-time behaviours, cigarette smoking, weekly spending money, self esteem, region and grade by sex, and conducted four logistic regression models to examine factors associated with more than 2 hours a day of sedentary screen time.

Results: Of 51 922 Canadian youth in grades 6 to 12, 50.9% spent more than 2 hours per day in screen-based behaviours. The average daily screen time was 7.8 (\pm 2.3) hours. Males and current smokers were more likely to report over 2 hours per day watching TV and videos or playing video games, whereas students in higher grades and those with weekly spending money were more likely to report playing or surfing on a computer. Youth with higher self-esteem were less likely to report spending over 2 hours per day in each of the three screen-time behaviours examined.

Conclusion: Developing a better understanding of the factors associated with more hours of screen time is required to develop and target interventions that reduce screen-time behaviours.

Keywords: *sedentary behaviour, youth/child, screen time, Youth Smoking Survey, tobacco, surveillance, self esteem*

Introduction

Screen-based sedentary behaviours likely have a negative impact on many different aspects of youth health and development.¹⁻² For instance, the increasing trend in youth obesity in North America coincides with an increasing prevalence of youth reporting over 3 hours of screen time per day.³ The American Academy of Pediatrics⁴ has developed guidelines that recommend limiting children's total entertainment screen time to no more than 1 to 2 hours of quality

programming per day. Considering that few Canadian youth currently meet these recommendations,⁵⁻⁶ activities designed to reduce sedentary screen time among youth should be a public health priority.

A substantial body of research has examined characteristics associated with watching television (TV).^{3,6-8} More recently, other types of sedentary screen-time behaviours have also garnered attention, for example, playing video games and using computers.^{5,6,8} It seems that youth are more likely

to spend time in these types of screen-based behaviours if they are male,^{5,6,9-11} older,^{5,9,11} from a low income family⁹ or if they engage in risk behaviours such as smoking.¹² Given that this is also a developmental period when youth's self-esteem is associated with the likelihood of their engaging in health-promoting or inhibiting behaviours,¹³ it is important to determine if screen time is associated with self-esteem. Considering that excessive screen time is associated with an increased risk of obesity^{1,3} and engaging in other risk behaviours,⁵ a better understanding of different screen-time behaviours would provide valuable insight for targeting or tailoring interventions to prevent or reduce screen time among youth populations.

The purpose of our study was to determine the percentage of Canadian youth who exceed the recommended screen time guideline and to identify characteristics associated with different screen-time behaviours.

Methods

Our study used nationally representative data collected from 51 922 students in grades 6 to 12 as part of the 2008/2009 Canadian Youth Smoking Survey (YSS).¹⁴ In brief, the target population for this study consisted of all young Canadian residents in grades 6 to 12 attending public and private secondary schools in 10 Canadian provinces. The YSS was administered to students during class time, and participants were not compensated. To reduce demands on schools and to increase student participation rates, the YSS used active information with passive consent.

Author references

1. Department of Health Studies and Gerontology, University of Waterloo, Waterloo, Ontario, Canada
2. Department of Statistics and Actuarial Science, University of Waterloo, Waterloo, Ontario, Canada

Correspondence: Scott T. Leatherdale, Department of Health Studies and Gerontology, University of Waterloo, 200 University Avenue West, Waterloo ON N2L 3G1
Tel.: (519) 888-4567 ext 37812; Fax: (519) 886-6424; Email: sleather@uwaterloo.ca

The YSS asked respondents to report the average number of hours per day that they spent (a) watching TV or videos,* (b) playing video games and (c) playing games or surfing the Internet on a computer. Respondents could choose from “none,” “less than 1 hour a day,” “1 to 2 hours a day,” “more than 2 hours a day but less than 5 hours a day,” or “5 or more hours a day” for each behaviour. Consistent with existing research^{8,15} and guidelines,⁴ we grouped responses for each construct into two categories (≤ 2 hours/day, > 2 hours/day) for each individual activity and for the total screen time. We calculated a conservative estimate of the mean screen time per day based on the lowest value of each response category reported. The YSS also collected information on demographics, cigarette smoking behaviour, weekly spending money and self-esteem. Specific details on these measures are available elsewhere.[†]

We examined descriptive analyses of our three sedentary behaviour constructs as well as cigarette smoking behaviour, weekly spending money, self-esteem, region and grade by sex. We then conducted four logistic regression models to examine factors associated with watching TV or videos, playing video games, and playing or surfing on a computer for more than 2 hours a day per each behaviour as well as total screen time for more than 2 hours a day. Survey weights for descriptive statistics were used to adjust for differential response rates across regions or groups; the statistical package SAS version 8.02 was used for all analyses.¹⁶

Results

Respondent characteristics

The study sample was 48.7% male and 51.3% female, representing 1 388 139 boys and 1 460 341 girls. Among students in grades 6 to 12, 30.2% ($n = 836 518$) reported watching over 2 hours of TV or videos per day (mean 3.0 ± 0.9 h/d);

* Video time refers to TV series or movies watched at home, on video tape, DVD or Blu-ray. In our preliminary research validating the comprehension of these measures with youth populations, the youth we sampled interpreted the term “video” to refer to any type of movie or TV series watched at home.

† www.yss.uwaterloo.ca

13.7% ($n = 372 132$) reported playing video games for over 2 hours per day (mean 2.1 ± 1.1 h/d) and 29.9% ($n = 814 116$) reported playing or surfing on a computer for

over 2 hours per day (mean 2.9 ± 1.1 h/d). Overall, 50.9% ($n = 1 439 311$) of Canadian youth spent over 2 hours per day on total screen time (Table 1).

TABLE 1
Descriptive statistics for youth in the Youth Smoking Survey by sex, 2008/2009, Canada

	Male (n = 1 388 139) % ^a	Youth Female (n = 1 460 341) % ^a	Total (n = 2 848 480) % ^a	
Grade				
6	13.1	13.6	13.3	
7	13.8	14.2	14.0	
8	14.3	14.5	14.4	
9	14.9	14.8	14.8	
10	15.5	14.8	15.2	
11	14.9	14.7	14.8	
12	13.5	13.4	13.5	
Smoking status				
Never smoker	90.1	92.5	91.3	
Current smoker	8.9	6.4	7.7	
Former smoker	1.0	1.1	1.0	
Weekly spending money, \$				
0	21.9	19.0	20.5	
1–20	38.4	41.4	39.8	
21–100	24.1	27.1	25.6	
> 100	15.6	12.5	14.1	
Self-esteem (derived score from 0 to 12)				
0–4	1.8	3.3	2.6	
5–8	23.3	38.4	30.6	
9	16.2	17.2	16.7	
10	20.6	16.4	18.6	
11	22.5	15.3	19.0	
12	15.6	9.4	12.5	
Region				
Atlantic Canada ^b	6.7	7.2	6.9	
Quebec	19.3	19.4	19.4	
Ontario	41.4	40.5	40.9	
Prairies ^c	18.8	19.0	18.9	
British Columbia	13.8	13.9	13.9	
Screen-time behaviour (average h/d)				
Watching TV or videos ^d	≤ 2	68.8	70.8	69.8
	> 2	31.2	29.2	30.2
Playing video games	≤ 2	76.6	96.6	86.3
	> 2	23.4	3.4	13.7
Playing/surfing on a computer	≤ 2	71.7	68.3	70.1
	> 2	28.3	31.4	29.9
Total screen time (all behaviours)	≤ 2	46.4	52.0	49.1
	> 2	53.6	48.0	50.9

Abbreviations: CI, confidence interval; d, day; h, hour; n, sample size.

^a Weighted population estimate.

^b New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador.

^c Alberta, Saskatchewan, Manitoba.

^d “Videos” refers to TV series or movies watched at home, on video tape, DVD or Blu-ray.

FIGURE 1
Prevalence of sedentary behaviours by region, Canada, 2008/2009

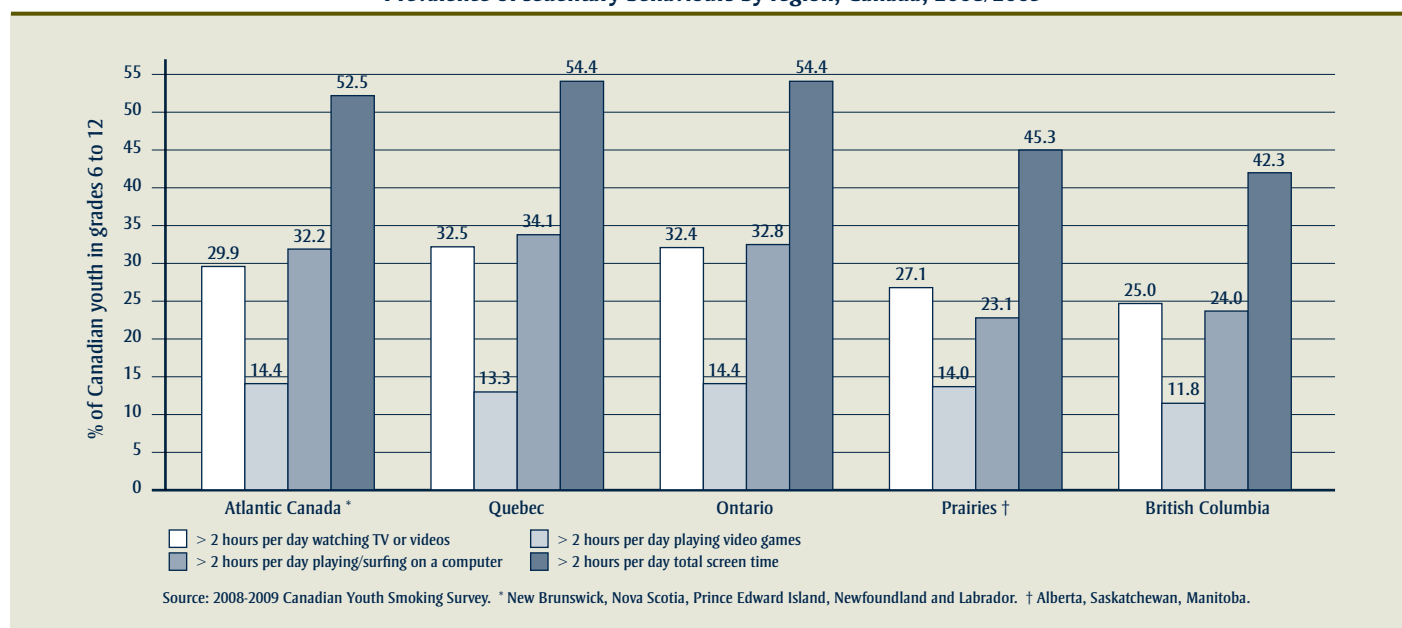


TABLE 2
Logistic regression analyses examining characteristics associated with screen-time behaviours among youth (grades 6 to 12) in the Youth Smoking Survey, 2008/2009, Canada

Characteristic	Screen-time behaviour, adjusted OR ^a (95% CI) (n = 51 922)			
	Watching TV or videos ^b > 2h/d vs. ≤ 2 h/d ^c	Playing video games > 2h/d vs. ≤ 2 h/d ^d	Playing/surfing on a computer > 2h/d vs. ≤ 2 h/d ^e	Total screen time > 2h/d vs. ≤ 2 h/d ^f
Sex				
Female	1.00	1.00	1.00	1.00
Male	1.16 (1.12–1.22)***	10.18 (9.41–11.01)***	1.00 (0.97–1.04)	1.46 (1.41–1.52)
Grade				
6	1.00	1.00	1.00	1.00
7	1.01 (0.94–1.09)	1.14 (1.02–1.28)*	1.38 (1.26–1.51)***	1.16 (1.08–1.25)***
8	0.99 (0.91–1.07)	1.47 (1.32–1.63)***	1.88 (1.73–2.05)***	1.46 (1.36–1.57)***
9	0.83 (0.77–0.90)***	1.20 (1.07–1.34)**	1.94 (1.78–2.11)***	1.32 (1.22–1.42)***
10	0.82 (0.76–0.89)***	0.99 (0.89–1.11)	1.86 (1.71–2.03)***	1.18 (1.09–1.27)***
11	0.65 (0.59–0.70)***	0.88 (0.78–0.99)*	1.77 (1.62–1.94)***	1.10 (1.02–1.19)*
12	0.71 (0.65–0.77)***	0.59 (0.52–0.68)***	1.80 (1.64–1.98)***	1.09 (1.01–1.18)*
Smoking status				
Never smoker	1.00	1.00	1.00	1.00
Current smoker	1.15 (1.06–1.24)***	1.23 (1.10–1.37)***	1.00 (0.92–1.09)	0.99 (0.92–1.07)
Former smoker	1.27 (1.01–1.58)*	1.26 (0.92–1.72)	0.61 (0.47–0.78)***	0.89 (0.72–1.09)
Weekly spending money, \$				
0	1.00	1.00	1.00	1.00
1–20	0.88 (0.84–0.93)***	0.86 (0.80–0.93)***	1.06 (1.00–1.12)*	0.95 (0.90–0.99)*
21–100	0.89 (0.84–0.93)***	0.81 (0.74–0.88)***	1.14 (1.07–1.22)***	0.97 (0.91–1.02)
> 100	0.81 (0.75–0.88)***	0.98 (0.88–1.09)	0.99 (0.91–1.07)	0.80 (0.74–0.86)***
Self-esteem, each 1 unit increase	0.91 (0.90–0.92)***	0.88 (0.87–0.90)***	0.85 (0.84–0.86)***	0.85 (0.84–0.86)***

Abbreviations: CI, confidence interval; d, day; h, hour; n, sample size; OR, odds ratio.

^a Odds ratios controlling for region and adjusted for all other variables in the table.

^b "Videos" refers to TV series or movies watched at home, on video tape, DVD or Blu-ray.

^c 1 is the equivalent of > 2 hours watching TV or videos per day (n = 12 671), 0 is the equivalent of ≤ 2 hours watching TV or videos per day (n = 30 838).

^d 1 is the equivalent of > 2 hours playing video games per day (n = 5818), 0 is the equivalent of ≤ 2 hours playing video games per day (n = 36 724).

^e 1 is the equivalent of > 2 hours playing/surfing on a computer per day (n = 12 375), 0 is the equivalent of ≤ 2 hours playing/surfing on a computer per day (n = 30 298).

^f 1 is the equivalent of > 2 hours total screen time per day (n = 22 123), 0 is the equivalent of ≤ 2 hours total screen time per day (n = 22 415).

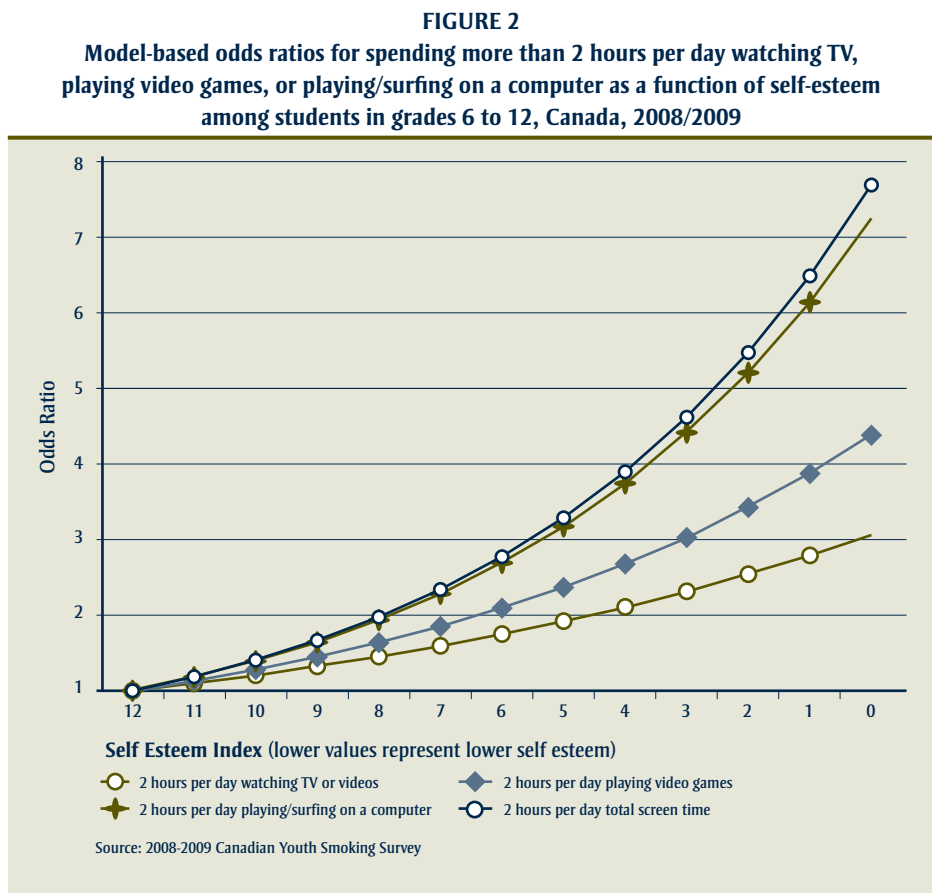
* p < .05 ** p < .01 *** p < .001

Boys were more likely than girls to report spending over 2 hours per day watching TV or videos ($\chi^2 = 23.3$; $df = 1$; $p < .001$) and playing video games ($\chi^2 = 4164.0$; $df = 1$; $p < .001$), whereas girls were more likely than boys to report spending over 2 hours per day playing or surfing on a computer ($\chi^2 = 66.2$; $df = 1$; $p < .001$). Boys were also more likely than girls to spend over 2 hours per day in total screen time ($\chi^2 = 158.6$; $df = 1$; $p < .001$). Overall, students spent an average of 7.8 (± 2.3) hours per day in these three sedentary activities (boys 8.3 ± 2.5 h/d; girls 7.3 ± 2.1 h/d).

The prevalence of sedentary behaviours across regions varied substantially (see Figure 1). For instance, the prevalence of students reporting watching over 2 hours of TV or videos per day or playing or surfing on a computer was substantially lower in the Prairies and British Columbia than in the rest of Canada. Conversely, the prevalence of students reporting watching over 2 hours of total screen time per day was highest in Quebec and Ontario.

Watching TV or videos. Compared to never smokers, both current smokers and former smokers were more likely to report watching TV or videos (movies on video tape, DVD or Blu-ray) for over 2 hours per day (Table 2). Conversely, relative to students in grade 6, students in grades 9, 10, 11 or 12 were less likely to report watching TV or videos for over 2 hours per day. Compared to students with no weekly spending money, the odds of reporting watching over 2 hours of TV or videos per day decreased among students with weekly spending money. Students with lower self-esteem were more likely to report watching over 2 hours per day of TV or videos than students with higher self-esteem (Figure 2).

Playing video games. Compared to students in grade 6, students in grades 7, 8 and 9 were more likely to report playing video games for over 2 hours per day, and students in grades 11 and 12 were less likely to report playing video games for over 2 hours per day. Compared to students with no weekly spending money, the odds of reporting over 2 hours of video games per day decreased among students with \$1 to \$100 weekly spending money.



Current smokers were more likely than never smokers to report playing video games for over 2 hours per day. Students with lower self-esteem were more likely to report playing video games for over 2 hours per day than students with higher self-esteem (Figure 2).

Playing or surfing the Internet on a computer. Compared to students in grade 6, students in higher grades were more likely to report playing or surfing on a computer for over 2 hours per day. Compared to students with no weekly spending money, the odds of reporting playing or surfing on a computer for over 2 hours per day increased among those with \$1 to \$100 weekly spending money. Compared to never smokers, former smokers were less likely to report playing or surfing on a computer for over 2 hours per day. Students with lower self-esteem were more likely to report playing or surfing on a computer for over 2 hours per day than students with higher self-esteem (Figure 2).

Total screen time. Relative to students in grade 6, students in higher grades were more likely to report over 2 hours of total screen time per day. Compared to students with no weekly spending money, the odds of reporting over 2 hours per day of total screen time decreased among students with over \$100 weekly spending money. Smoking status was not significantly associated with total screen time. Students with lower self-esteem were more likely to report over 2 hours per day of total screen time than students with higher self-esteem (Figure 2).

Discussion

Developing a better understanding of screen-time behaviours and the factors associated with them can be used to inform the development of prevention programming among youth populations. This study showed that grade 6 to 12 students in our nationally representative sample are very involved in screen-time behaviours; these data also support the recommendation that intervention efforts to reduce screen time must begin prior to adolescence.¹⁷ Given that our

sample demographics are consistent with other North American youth populations,^{18,19} these findings are fairly representative within that context.

Our study showed that the majority—over 1.4 million—of Canadian youth in grades 6 to 12 exceeded the recommended guidelines of less than 2 hours of screen time per day.⁴ Even when using a conservative estimate of average screen time, the youth in our sample exceeded existing guidelines by over 5 hours per day; the daily average time for each individual screen-based behaviour also exceeded recommendations for total screen time. A substantial number of youth exceeded the guideline recommendations based on their daily time spent in a single screen-time behaviour, consistent with previously published Canadian data from 2001/2002.⁶ This suggests that there is substantial room for decreasing screen time by at least 90 minutes per day as recommended by Canada's Physical Activity Guides for Children and Youth.²⁰ However, considering that screen time is a behaviour distinct from a lack of physical activity^{15,21,22} and that many youth with high levels of screen time are also highly active,²¹ those behaviour-specific interventions that are designed to reduce screen time by promoting physical activity may be inadequate.

Consistent with earlier research,^{5,6,9-11} males were more likely to report more screen time than females. However, in our study this was not consistent across the three screen-based behaviours. Although boys were more likely to watch TV or videos and play video games for over 2 hours per day in the predictive models, the sex of the respondent was not significantly associated with time spent surfing or playing on a computer. Similarly, although earlier research suggested that older students are more likely to report more screen time than younger students,⁹ we found that students in higher grades were more likely to play/surf on a computer for over 2 hours per day but less likely to watch TV or videos or play video games for over 2 hours per day compared to grade 6 students. These findings suggest that further research is required to evaluate the impact of sex- or grade-specific interventions to reduce screen time among youth.

To the best of our knowledge, this is the first study to identify a significant association between self-esteem and screen-time behaviour, contradicting previous research that suggested self-esteem was not associated with sedentary behaviour.¹¹ Since youth who are involved in sports and clubs after school have higher self-esteem than those who are not engaged in such activities,¹³ and rates of screen-time behaviours are highest after school,²³ interventions should be designed to engage students in extracurricular activities that could reduce their screen time after school and improve their self-esteem. If effective, such interventions could be very important as low self-esteem and screen time have both been linked to numerous negative health outcomes among youth, such as smoking and other substance abuse.^{12,13}

Earlier research suggested that youth with lower income parents are more likely to report more than 2 hours of screen time per day than youth with higher income parents.⁹ We found that the disposable income of students is associated with time spent in all three screen-based behaviours, but the direction of the association is not the same across all behaviours. This suggests that a tailored approach to reducing screen time may be required for youth populations based on their disposable income. Consistent with previous research,¹² we also found that current smokers tended to spend more time watching TV and videos and playing video games. It would be useful to evaluate the impact of reducing sedentariness on the smoking behaviour of this sub-population of at-risk youth.

Limitations

This study had several limitations. Since no data on physical activity or obesity exist among the YSS measurement tools, we were unable to examine the association between screen time and these correlates. The measure used for sedentary behaviour in the 2008/2009 YSS do not allow us to calculate respondents' total sedentary time, or to determine the time spent in different sedentary behaviours on weekdays versus weekends. Although the 2008/2009 YSS collected a measure of time spent reading for fun, we did not include this in our research because

education stakeholders consider reading for fun constructive due to its positive impact on educational performance rather than lacking a health benefit for youth. Further, causal relationships cannot be inferred from these cross-sectional data. Data were also based on self-reports so the validity of the responses may be questionable; however, honest reporting was encouraged by ensuring confidentiality during data collection.

Conclusion

With the high prevalence of Canadian youth exceeding recommended guidelines for screen time, we need to improve our understanding of the reasons for these sedentary behaviours and their correlates. This may be especially pertinent if the rise in obesity among youth populations is in fact influenced by an overall decrease in energy expenditure due to increased sedentary behaviour. Considering that most nationally representative surveillance data do not monitor different sedentary behaviours,²⁴ the insight gained from this study provides a better understanding of the prevalence of different screen-time behaviours among Canadian youth as well as insight for tailoring future screen-time reduction interventions.

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