Research Article

The effects of screen timing on young children's eating habits

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Abstract

Young children now growing up in settings filled with a variety of technological devices. Despite the recommendation that parents should limit screen time, many young children are exposed to screens at very early ages and for a long duration of time. This study aimed to investigate the associations between the excessive technology use of young children on eating habits. A cross sectional study was conducted among 208 parents of typically-developing hail children to investigate the relationship between prolonged screen time viewing on eating habits using an online-questionnaire survey. A translated validated questionnaire used for data collection consisted of three parts: Children's Eating Habits Questionnaire, Questionnaire on the Impact of Technology on Children and socio demographic questions (e.g, children's sex, age, educational level, marital status of parents and monthly income). Statistical Package for Social Sciences (IBM SPSS v26) are used. Frequency distribution was the main descriptive statistics used in the analysis. Many of the children use technology (94%) and have a device (80%). 77% of the children usually use eDevices while having meals. All variables (weight and eating habits), except giving fast food as reward, are significantly associated with screen hours, since the p-values of the chi-square test are < 0.05. More precise measurement of early media exposure is needed to predict the long-term impacts of media exposure on children's eating habits.

1. Introduction

Children in many countries may become more sedentary as a result of the SARS-CoV-2 pandemic and subsequent limitations in spring 2020, with fewer opportunities to engage in the sufficient degree of physical activity to improve their physical as well as mental health [1]. The children's health and daily routines were jeopardized by the lockdown's social and physical constraints. A typical aspect of lockdown is increased comfort eating, which is exacerbated when people are unable to communicate their thoughts [2]. Working from home, online schooling, and social media usage have all contributed to an increase in screen time [3]. The food industry has been quick to identify this change in their target audience and has intensified online advertising and focused on children [4]. Food purchases jumped by 124 percent, as did take-away food purchases. Currently, young generation experiences electronic media and technology as a central part of their lives. Over the past 20 years, the daily duration of time that children are exposed to electronic devices is increasing, while age at first exposure is decreasing [5].

Even in low-income homes, more children are utilizing emerging digital technologies on a regular basis, such as interactive and mobile media [6,] and they continue to be the target of aggressive marketing. With widespread ownership and use of new portable

touchscreen-based devices, the screen-media landscape has changed dramatically in the last decade, causing changes in the volume of screen media use and the way children and young people entertain themselves and communicate with friends and family members [7]. The invention of mobile devices has changed where and how children spend screen time, including viewing alone, using different devices one after the other, watching traditional television programs on mobile devices, watching mobile outside of the home, and also the use of mobile in schools and daycare settings [5]. Behavior of children is mainly influenced by parents own behavior. Children copy their parents' food choices to some extent, and an active parental lifestyle leads to increased physical activity in children [8]. Media influences may be best understood through the perspective of the family system. For instance, parent media use and child media use are correlated: higher parental media usage is associated with higher media usage by their young children [9].

The impact of screens on children and young people's health has been increasing, with evidence indicating that screen time is associated with obesity and has an impact on nutritional quality by causing excessive consumption of nutrient-poor foods and calories. Excess screen time was linked to increased weight status through nocturnal ingestion of sugary beverages, fried meats, and varied sweets, according to a cross-sectional research of 659,288 adolescents [10]. When compared to adolescents who do not have obesity, obese adolescents are five times more likely to have obesity as adults [11]. It is believed that exposure to food advertising and watching television while eating which diminishes attention to satiety cues drives these associations [12]. It has also been shown that high screen time negatively affects irritability, low mood, and cognitive and social development, leading to poor educational performance [5]. Furthermore, lack of sleep during childhood is linked to poor mental and physical health. Many cross-sectional studies show links between television viewing and the presence of a bedroom television and poor sleep in older children and adolescents, but longitudinal data is few [13]. Sedentary behavior has been shown to persist across age, implying that children who spend more time watching TV as children watch more TV as adults, and that these early

life behaviors may be linked to negative health outcomes such as increased BMI and serum cholesterol levels, as well as decreased cardiorespiratory fitness later in life [14]. Because technology interrupts children's regular routines, it might lead to a decline in physical activity. Physical exercise is necessary to maintain appropriate blood pressure and glucose levels, as well as to enhance sleep patterns, immunological response, and metabolism. As suggested by the World Health Organization (WHO), the child in developing age needs a minimum of one hour per day of moderate to heavy intensity physical activity. The advantages are greater if the daily activity exceeds 60 min [15].

American Academy of Pediatrics recommends avoiding the use of screen-based devices in children younger than 18 months due to potentially negative consequences [16], children 2 to 5 years old should be allowed 1 hour a day of quality programming on screens. Similar screen time guidelines have been issued by government health organizations such as the World Health Organization [17] and Canada and Australia [18-19].

2. Materials and methods

A cross sectional study was conducted among 208 parents of typically-developing Hail children to investigate the relationship between prolonged screen time viewing on eating habits using an online-questionnaire survey. A translated validated questionnaire used for data collection consisted of three parts: Children's Eating Habits Questionnaire, Questionnaire on the Impact of Technology on Children and socio-demographic questions (e.g, gender of children, their age, parent's educational level and marital status, as well as and monthly income).

2.1 Data Collection

An online, translated validated questionnaire was used to collect the required data from each participant. The questionnaire consisted of three parts: Children's Eating Habits Questionnaire, Questionnaire on the Impact of Technology on Children and socio-demographic questions (e.g, children's sex, age, educational level, marital status of parents and monthly income).

2.2 Data Analysis

Statistical Package for Social Sciences (IBM SPSS v26)

are used. Frequency distribution was the main descriptive statistics used in the analysis. Chi-square test checks the existence of an association (relationship) between two categorical variables (categorical variables are those non-numerical, such as gender, marital status, education, falling, etc.). Chi-square does a series of statistical and probability calculations to finally produce a value, called P-value. This value ranges between 0 and 1. If it's < .05, then the association between the two variables is statistically significant, otherwise if p-value is > .05, then the association isn't statically significant. Several methods of computations are proposed to perform the chi-square test. We will mainly use 2 methods based on the situation: Pearson's method: when the sampling is adequate (no issue regarding small samples). Likelihood ratio method: when the sampling is inadequate (there are issues regarding small samples).

3. Results

3.1 A: Descriptive Statistics

3.1.1 Sample Characteristics and Demographics

The sample is roughly divided between males and females (47% and 53%). In this sample, the older the child age group, the more frequent it is in the sample, starting at 14% for those 1-3 years old, and ending at 35% for those 10+. The median child weight is "20-30" (note: median weight range is the first weight range that makes 50%+ for itself and anything below it). Median child height is 80 - 100 cm. The most frequent child order (in the family) is being 1st at 40%, while the rest (60%) is distributed on different orders from 2nd to 5th. The majority of the participants are Saudi (90%). Around 3 quarters of the participating parents are mothers. Median parent age group (the one who filled the questionnaire) is "35-40." Approximately half of the participants have income between SAR 5,000 and 15,000. Roughly, 3 quarters of the participants (73%) hold the bachelor's degree.

3.1.2 Descriptive Statistics for the Main Questions of the Questionnaire

3.1.2.1 Yes/No Questions

The majority of the children use technology (94%) and have a device (80%). Two thirds of the children can eat without watching the eDevice, while one third cannot. However, this rarely happens as 77% of the children usually use eDevices while having meals. Most of the

Table 1. Sociodemographic characteristics of subjects

Variable	Categories	Freq.	N = 208 (%)
Child gender	Male	98	47.1
	Female	110	52.9
Child age	1 - 3	30	14.4
	4 - 6	45	21.6
	7 - 9	61	29.3
	10+	72	34.6
Child weight (Kg)	10 - 20	52	25.0
	20 - 30	63	30.3
	30 - 40	56	26.9
	40 - 50	28	13.5
	50 - 60	7	3.4
	60+	2	1.0
Child height (cm)	< 80	41	19.7
	80 - 100	64	30.8
	100 - 120	54	26.0
	120+	49	23.6
Child order	1	84	40.4
	2	36	17.3
	3	33	15.9
	4	21	10.1
	5	34	16.3
Nationality	Saudi	187	89.9
	Non-Saudi	21	10.1
Participating parent	Father	51	24.5
	Mother	157	75.5
Age (of the questionnaire filler)	25 - 30	44	21.2
	30 - 35	41	19.7
	35 - 40	44	21.2
	40 - 45	37	17.8
	45 - 50	30	14.4
	50+	12	5.8
Marital status	Married	199	95.7
	Divorced	3	1.4
	Widowed	6	2.9
Income	< 5000	46	22.1
	5000 - 15000	102	49.0
	> 15000	60	28.8
Education (of the filler)	Not educated	1	0.5
	High school	40	19.2
	Bachelor	151	72.6
	Master	15	7.2
	PhD	1	0.5

participating parents (69%) use rules to control duration of technology use among their children. More than half of the children (57%) are allowed to use eDevices at bedroom. Parents are roughly divided between those who use or do not use fast-food as reward for their child good behavior.
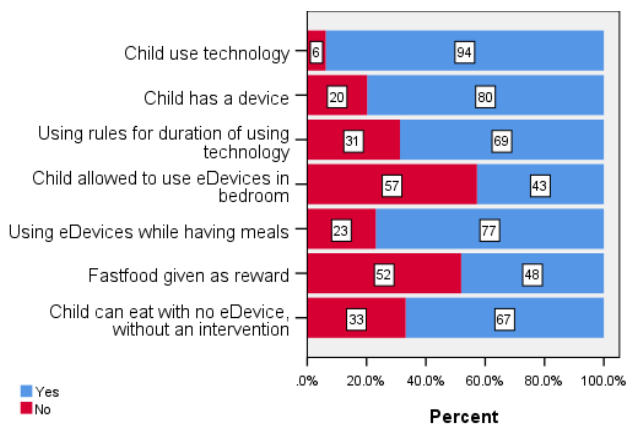
Figure 1. Other questions: child age when first used the e-device: Approximately one half of the children were 4-6 years old when they first used the device.
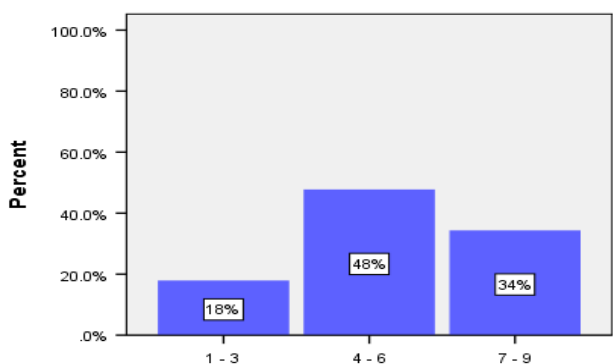

Figure 2. Screen Hours: The median screen hours' range is 3-6 (median range = the first range that makes up 50%+ for itself and the ranges below it).
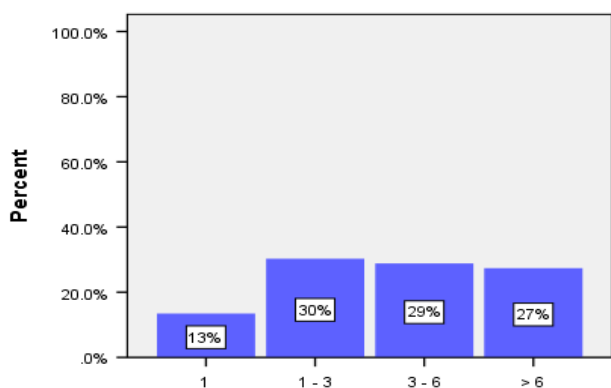

Figure 3. Child School Performance: The majority of the children (88%) have very good/excellent school performance (and most of these are "excellent" cases).
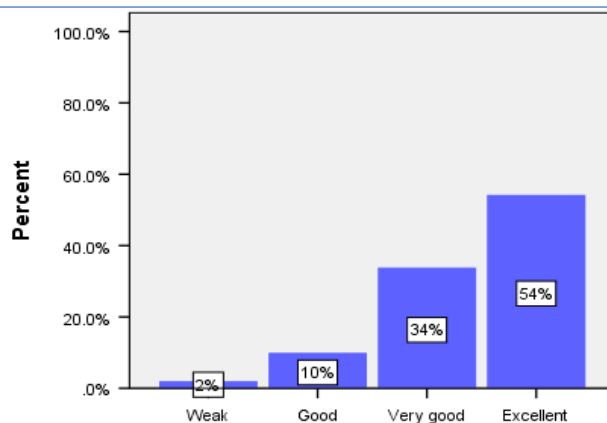

Figure 4. Breakfast Frequency: Most of the children (62%) often / always eat their breakfast, while 36% sometimes eat it and very rare cases never eat it.
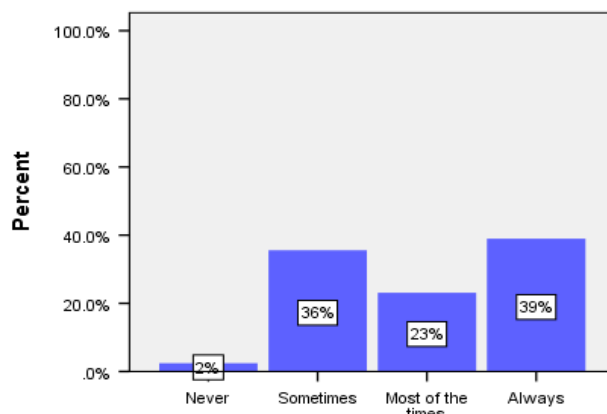

Figure 5. Frequency of Eating 3 Meals Daily: Very similar pattern can be seen here as that explained in the previous graph.
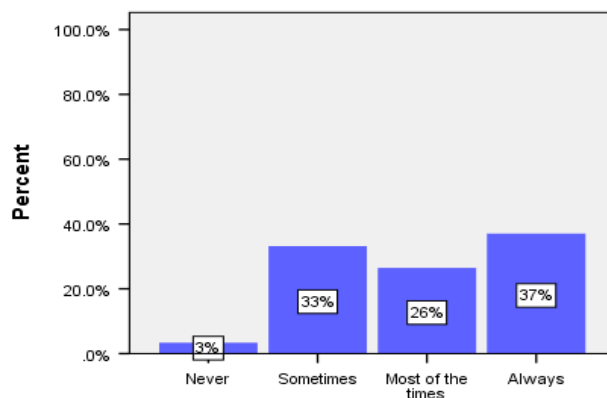

Figure 6. Frequency for Eating Fruits/Vegetables: The median frequency for eating fruits / vegetables is once a week (note: the median category is the first that makes up 50%+ for itself and the groups below it).
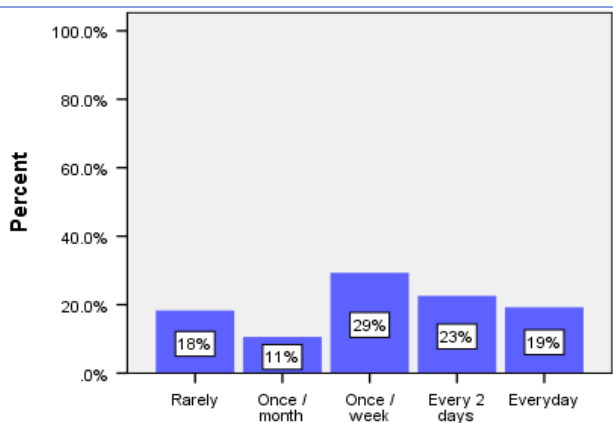
Figure 7. Fast-food Frequency: Half of the children eat fast-food once a week, while around one quarter (24%) eat fast-food once a month.
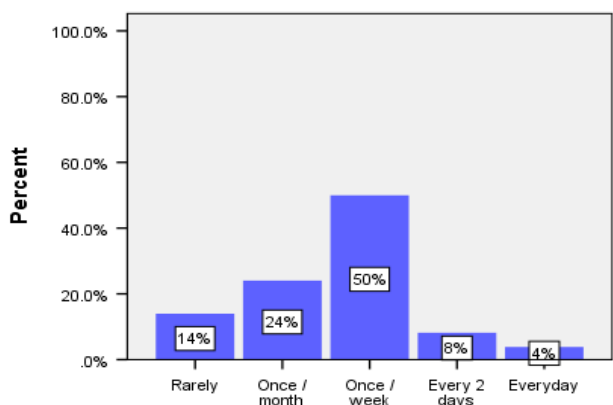

Figure 8. Frequency of Taking Soft Drinks: The biggest portion of the participants (43%) rarely take soft drinks, while half of the remaining (of participants) take it once a week.
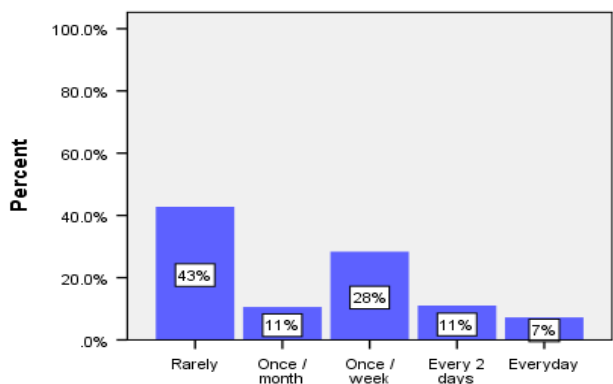

Figure 9. Child's Personality: The 2 most present personalities among children in the sample are social (around one third) and active (29%). The "quiet" and sensitive personalities have relatively less presence (24% and 14% respectively).
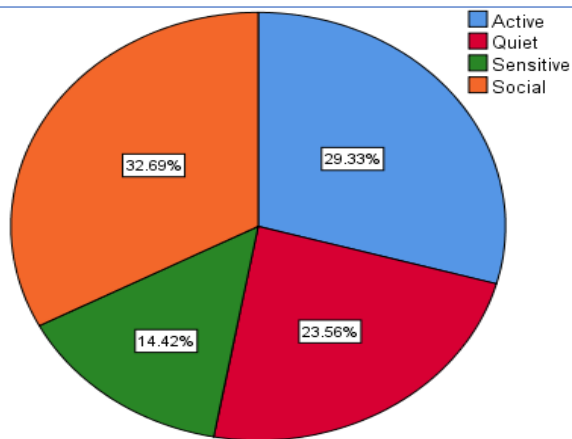

Figure 10. Psychosocial characteristics of the participants. Around 32% were social, 29% were active. Whereas 23% were quiet and 14% were found to be sensitive.

4. Discussion

All variables (weight and eating habits), except giving fast food as reward, are significantly associated with screen hours, since the p-values of the chi-square test are < .05. This significance should be clearly reflected in how children with different screen hours vary from each other in their weight and eating habits. To illustrate, consider the following.

4.1 Screen hours vs. child weight

we can see that the percentage of high weight (40 - 50 Kg) is lowest for those children who use the eDevice 1 hour a day, and it's 0%, then it's 7% for children with 1-3 h usage, 10% for children with 3-6 h usage and 35% for children with > 6 h usage (we can see how weight increases as screen hours increase).

4.2 Screen hours vs. breakfast frequency

If we ignore those with 1 daily hour of screen usage, we can see that as hours increase, the percentage of those who always eat breakfast decreases; for those with 1-3 h usage it's 49%, then for 3-6 hours It's 37% and for > 6 hours it's 29%. The reason why we ignored the first group of people (those with 1 hour of screen usage) is because it actually contradicts the explained relationship, since the percentage of "always" in this group, which is 39%, is lower than that when usage is 1-3 hours (while it should be more!). This is because this group of people (with very low screen usage) might be too active children who play all the night and get exhausted, which causes them to skip breakfast too.

Table 2. The association between screen hours and weight/ eating habits

Screen Hours	N	Child Weight				P-value
		10 -20	20 - 30	30 - 40	40 - 50	
1	28	67.9%	21.4%	10.7%	0.0%	0.000
1 - 3	60	35.0%	36.7%	21.7%	6.7%	
3 - 6	59	10.2%	42.4%	37.3%	10.2%	
> 6	52	11.5%	19.2%	34.6%	34.6%	
		Breakfast Frequency				
		Never	Sometimes	Most of the times	Always	
1	28	0.0%	42.9%	17.9%	39.3%	0.002
1 - 3	63	0.0%	22.2%	28.6%	49.2%	
3 - 6	60	0.0%	35.0%	28.3%	36.7%	
> 6	57	8.8%	47.4%	14.0%	29.8%	
		Frequency of Eating 3 Meals / Day				
		Never	Sometimes	Most of the times	Always	
1	28	7.1%	42.9%	21.4%	28.6%	0.030
1 - 3	63	1.6%	19.0%	27.0%	52.4%	
3 - 6	60	1.7%	38.3%	21.7%	38.3%	
> 6	57	5.3%	38.6%	33.3%	22.8%	
		Using eDevices while Having Meals				
		Yes	No			
1	28	39.3%	60.7%			0.000
1 - 3	63	63.5%	36.5%			
3 - 6	60	90.0%	10.0%			
> 6	57	96.5%	3.5%			
		Frequency of Eating Fruits / Vegetables				
		Rarely	Once/month	Once /week	Every 2 days	Everyday
1	28	3.6%	0.0%	21.4%	28.6%	46.4%	0.000
1 - 3	63	7.9%	7.9%	27.0%	30.2%	27.0%	
3 - 6	60	11.7%	10.0%	36.7%	28.3%	13.3%	
> 6	57	43.9%	19.3%	28.1%	5.3%	3.5%	
		Fast-food Eating Frequency				
		Rarely	Once/month	Once /week	Every 2 days	Everyday
1	28	35.7%	21.4%	42.9%			0.000
1 - 3	63	22.2%	22.2%	47.6%	3.2%	4.8%	
3 - 6	60	6.7%	21.7%	50.0%	16.7%	5.0%	
> 6	57	1.8%	29.8%	56.1%	8.8%	3.5%	
		Frequency of Taking Soft Drinks				
		Rarely	Once /month	Once/week	Every 2 days	Everyday
1	28	64.3%	7.1%	21.4%		7.1%	0.001
1 - 3	63	50.8%	15.9%	25.4%	3.2%	4.8%	
3 - 6	60	43.3%	10.0%	21.7%	18.3%	6.7%	
> 6	57	22.8%	7.0%	42.1%	17.5%	10.5%	
		Fast-food as Reward				
		Yes	No			
1	28	39.3%	60.7%			0.718
1 - 3	63	52.4%	47.6%			
3 - 6	60	48.3%	51.7%			
> 6	57	47.4%	52.6%			
		Child Can Eat with No Device, Without Intervention				
		Yes	No			
1	28	89.3%	10.7%			0.000
1 - 3	63	79.4%	20.6%			
3 - 6	60	70.0%	30.0%			
> 6	57	38.6%	61.4%			

4.3 Screen hours vs. frequency of eating 3 meals

If we ignore those with 1 daily hour of screen usage, we can see that as hours increase, the percentage of those who always eat 3 meals decreases; for those with 1-3 h usage it's 52%, then for 3-6 hours It's 38% and for > 6 hours it's 23%. The reason why we ignored the first group of people (those with 1 hour of screen usage) is because it actually contradicts the explained relationship, since the percentage of "always" in this group, which is 29% is lower than that when usage is 1-3 hours (while it should be more!). This is because this group of people (with very low screen usage) might be too active children who play all the night and get exhausted, which causes them to skip one or more meals.

4.5 Screen hours vs. using eDevices while eating meals

We can see that as hours increase, the percentage of those who "use eDevices while eating" increases; for those with 1 hour of daily screen it's 39%, then for 1-3 h usage it's 63%, then for 3-6 hours It's 90% and for > 6 hours it's 96%.

4.6 Screen hours vs. frequency of eating fruits/vegetables

We can see that as hours increase, the percentage of those who daily eat fruits / vegetables decreases; for those with 1 hour of daily screen usage it's 46%, then for 1-3 h usage it's 27%, then for 3-6 hours It's 13% and for > 6 hours it's 4%.

4.7 Screen hours vs. fast-food eating frequency

We can see that as hours increase, the percentage of those who rarely eat fast-food decreases; for those with 1 hour of daily screen usage it's 36%, then for 1-3 h usage it's 22%, then for 3-6 hours It's 7% and for > 6 hours it's 2%.

4.8 Screen hours vs. frequency of taking soft drinks

We can see that as hours increase, the percentage of those who rarely take soft drinks decreases; for those with 1 hour of daily screen usage it's 64%, then for 1-3 h usage it's 51%, then for 3-6 hours It's 43% and for > 6 hours it's 23%.

4.9 Screen hours vs. eating without eDevice

We can see that this habit is more frequent among those with less screen hours; for those with 1 daily screen hours the percentage of children eating without eDevice is 89%, then it's 79% for those with 1-3 hours, then 70% for 3-6 hours and 39% for those with > 6 hours.

On the other hand, "screen hours" is not significantly associated with giving fast-food as a reward, since the p-value is > .05 (it's 0.718, which is > .05). The insignificance is clearly reflected in the percentage of children getting fast-food as reward across the various levels of screen hours; for those with 1 daily hour of screen it's 39%, then for 1-3 hours it's 52%, then for 3-6 hours it's 48% and for > 6 hours it's 47% (clearly: no much difference among these percentages; almost no change).

4.10 Recommendations

4.10.1 Minimize screen time:

a) Screen time for children younger than 2 years is not recommended.

b) For children 2 to 5 years, limit routine or regular screen time to less than 1 hour per day.

c) Ensure that sedentary screen time is not a routine part of child care for children younger than 5 years.

d) Schedule' screen-free' periods throughout the day, especially for family meals and book sharing.

e) Avoid screens for at least 1 hour before bedtime, given the potential for   melatonin-suppressing effects.

4.10.2 Mitigate (reduce) the risks associated with screen time

a) Be present and involved while using screens, and co-view with children whenever possible.

b) Be aware of content and prioritize educational, age-appropriate and interactive programming.

c) Use parenting strategies that promote self-control, calming and limit-setting.

5. Conclusions

In summary, more precise measurement of early media exposure is needed in order to predict the long-term impacts of media exposure on child's eating habits. There is currently no standardized, systematic, scalable, and cost-effective measurement tool that comprehensively and accurately captures child and household media exposure, as well as the social context surrounding exposure during the childhood. The lack of such a tool represents a critical barrier for researchers who aim to describe child and family media use, identify characteristics associated with media use, evaluate associations between media use and concurrent behavior, and assess eating habits associated with early media use.

Availability of data and materials

The data was available through online questionnaire. Processed through coded data sheet in excel.

Authors' contributions

The conceptualization, methodology, and analysis was done by Maram Abdulaziz and Rafia Bano. Writing and original draft preparation was done by Maram Abdulaziz. Review, editing and supervision as well as the final draft preparation was done by Rafia Bano. All authors have read and agreed to the published version of the manuscript.

Conflicts of interest

The authors declared no conflict of interest.

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