Journal of
Modern Rehabilitation

October 2021, Volume 15, Number 4

Review Article: Correlates of Screen Time in Children and Adolescents: A Systematic Review Study

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Citation: Shalani B, Azadfallah P, Farahani H. Correlates of Screen Time in Children and Adolescents: A Systematic Review Study. Journal of Modern Rehabilitation. 2021; 15(4):187-208. http://dx.doi.org/10.18502/jmr.v15i4.7740

http://dx.doi.org/10.18502/jmr.v15i4.7740

Article info:

Received: 30 Dec 2020

Accepted: 15 Feb 2021

Available Online: 01 Oct 2021

Publisher

Tehran University of Medical Sciences

ABSTRACT

Introduction: The use of screen media by children and adolescents is increasing and has destructive effects on various development aspects. This study was done to determine the correlates of Screen Time (ST) in children and adolescents.

Materials and Methods: Published articles from January 2000 to September 2020 were searched through PubMed, PsycNet, Science Direct, Medline, Scopus, and Web of Science databases. Magiran, SID, and IranDoc databases were searched for Persian studies with no time limitation. The used keywords were correlates OR predictors + screen time, screen use, screen viewing, screen media, mobile use, cellphone use, TV/ television viewing, TV/ television use, TV/ television, computer use, video game, Media exposure, Media use, electronic media, digital media, digital devices, tablet use + adolescent, youth, infants, toddlers, preschoolers, and children. The literature search identified 51 studies that met the inclusion criteria.

Results: After reviewing the studies according to the PRISMA checklist, the correlates were Grouped in five categories: (i) child biological and demographic correlates, (ii) behavioral correlates, (iii) family biological and demographic correlates, (iv) family structure related correlates, and (v) socio-cultural and environmental correlates. The most common correlates found were age, sex, and Body Mass Index (BMI) of children, age and education of parents, socio-economic status, physical activity, quality of the neighborhood, parents' ST, rules, and Digital Devices (DD) in the child/ adolescent's bedroom.

Conclusion: The ST in children and adolescents is associated with several factors at intrapersonal, interpersonal, and social/ cultural levels. It is suggested that health promotion programs to reduce the use of these devices should be implemented with a comprehensive view of the individual, family, and society.

Keywords: Screen time, Predictors, Correlates, Television, Video game, Children, Adolescent, Digital device

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1. Introduction

Technological advances in recent decades have increased the interaction of children and adolescents with screen-based technologies while reducing their relationship with nature and others [1]. Access to electronic devices and their presence in life is inevitable and concerns about the consequences of long-term Screen Time (ST), especially in children and adolescents, are growing [2]. Recent studies have shown that the variety, accessibility, and using time of television, computers, cell phones, tablets, game consoles, and other Digital Devices (DD) have increased rapidly over the past decade and among children and adolescents [3] and has changed the lifestyle of people in all age Groups. Although the American Academy of Pediatrics has banned the ST under the age of two and has set a time limit for older ages, the use of and exposure to ST has significantly increased among children and adolescents [4]. The results of a study showed that there was a low overall adherence to all three 24-hour recommendations, especially among youths (children: 13.9%, youth: 4.8%). Meeting two or more of the recommendations was associated with higher odds of positive psychosocial health among youths [5]. The results of another study showed that a small number of American children follow the instructions for ST [6]. Daily consumption analyses revealed that the higher weekly hours of TV viewing was associated with a less healthy diet, including more sweets and desserts in children, and more sugar-sweetened beverages in adolescents [7]. There is also strong evidence regarding the ST and its association with obesity/ overweight and depressive symptoms [8]. Excessive ST is associated with behavioral problems [9], sleep disturbance and quality [10, 11], violent behaviors [12], academic, developmental, and cognitive problems [13], executive functions [14], aggression and self-regulatory difficulties [15], Attention-Deficit/Hyperactivity Disorder (ADHD) [16], behavioral problems and anxiety [8], heart risk factors, lower fitness, undesirable behavior, lower self-esteem, and poor mental health in adolescents [17], and it is also a risk factor for metabolic diseases, cardiovascular diseases, such as hypertension, obesity, insulin resistance, and decreased bone density [18].

Although there are various guidelines on reducing ST, many children and adolescents still had extreme ST. Therefore, a closer look at the affecting factors can provide a more accurate understanding. Studies have shown a combination of factors, such as socio-economic status, urbanization, ST in parents, access to facilities at home, older age, TV background, sedentary parents, lack of security in the neighborhood, the presence of DD in the child/ adolescent room, BMI, gender, parenting pattern, watching a movie or turning on the TV at dinner time, access to DD and parental involvement in ST is related to the children and adolescents ST and can predict it [3, 19-24]. Therefore, it seems that different sets of the individual (child/ adolescent related) and family, school, society, and cultural factors are involved in ST as a multidimensional behavior and only one factor is not influential in its formation and continuation. Considering correlates, it is also important to identify their relative importance and categorize them. According to the bio-ecological perspective, behavior is done in the environmental and social context, which can affect the behavior; this model puts the individual at the center of the ecosystem and provides a better understanding of the factors and barriers that affect it [25]. This model provides a solid theoretical foundation for understanding healthy behavioral change and facilitates a better understanding of the factors associated with the ST. Therefore, using bio-ecological perspective to study and classify different levels of correlated factors plays an important role because using a category, changeable and unchangeable correlates can be identified at the individual, interpersonal, and environmental levels, and as a result, more practical and efficient programs can be developed to prevent, reduce, or control the ST.

Given the adverse and widespread effects of the ST on children and adolescents, understanding its correlates will help professionals to shape clinical and educational interventions to prevent its overuse, and potentially can avoid adverse health and developmental consequences, especially in high-risk Groups. To the best of our knowledge, no review has focused on the screen-viewing correlates among children and adolescents and compared them. This study, with a comparative view, in addition to identifying the correlates, intended to determine the type of effective correlates in childhood and adolescence; newer studies are also included compared to previous review studies. Therefore, the purpose of this study was to review the research background regarding the correlates of ST in children and adolescents from a bio-ecological perspective.

2. Materials and Methods

This review was aligned with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement for systematic reviews [26].

Inclusion criteria

The review sought to identify all studies reporting correlates of ST in children and adolescents (0 to 19 years). Scientific peer-reviewed published papers written in English and Persian were considered for this review. Studies were eligible only if (1) included children aged from zero (at birth) to 19 years (adolescence) years, (2) quantitative research had been done and had been published in English or Persian language in the peer-reviewed journal, (3) the sample was comprised of healthy young children, and (4) the method of study was descriptive, cross-sectional, qualitative, and case study.

Exclusion criteria

All research studies performed on specific Groups (pathology or patient), letters to the editor, meta-analysis, case study, studies that only had abstracts, and studies done on other age Groups were excluded.

Search strategy

Using a comprehensive search strategy, electronic databases (PubMed, PsycNet, Science Direct, Medline, Scopus, and Web of Science) were searched for English studies, up to September 2020, and Magiran, SID, and Irandoc databases were searched for studies in Persian with no time limitation. The used keywords were correlates OR predictors+ screen time, screen use, screen viewing, screen media, mobile use, cellphone use, TV/ television viewing, TV/ television use, TV/ television, computer use, video game, media exposure, media use, electronic media, digital media, digital devices, tablet use + adolescent, youth, infants, toddlers, preschoolers, and children.

The duplicates were removed. All titles and abstracts of potentially relevant papers were screened by two authors. Full-text copies were acquired for all papers that met title and abstract screening. The full-text screening was performed by the authors and examined according to the selection criteria. Discrepancies were discussed until the authors reached an agreement.

Data extraction

Data extraction was performed by one author and the data were checked by two others. Pre-established data extraction criteria were created with four items: (i) General information (authors' name and the study year, and design); (ii) Sample characteristics (size, age, and sex); (iii) ST correlates (variable, covariates, main findings, and direction of the association); and (iv) methods of statistical analysis (Table 1).

Study selection

We only included studies on the correlates of ST in children and adolescents aged 0 to 19 years. One independent reviewer screened the titles and abstracts of all studies. Also, a critical appraisal of systematic reviews was done by at least two independent reviewers to minimize bias. Of 139 titles, 46 studies were duplicated and removed and 42 studies were excluded; common reasons for exclusion were the aim of studies and finally, 51 articles were included based on the inclusion criteria. The decision about exclusion was made by reading the selected papers by one author and if necessary, discussion among the other authors. The study process is presented in Figure 1.

Risk of bias assessment

A modified version of the Downs and Black [27] checklist was used to assess the risk of bias in the studies included in the present review. The checklist contains 27 items, 10 (1–3, 6, 7, 10–12, 18, and 20) of which were related to the studies included in the present review (higher scores indicate superior quality). The risk of bias assessment was carried out by two independent assessors.

Coding of variables

The coding of variables followed the model used in a previous review by Hoyos Cillero et al. [28]. Findings were coded as positive (+), negative (-), or as Non-Association (NA) when studies reported that no association was found between the variable and ST. As the model suggests, we focused just on associations and not on their strength.

3. Results

The total number of samples was 268478 in the studies. The lowest number of samples was 122 [29] and the highest number was 66706 [30]. The age of children ranged from 0 months to 19 years. The statistical method was correlation and regression. Most studies were cross-sectional (35 studies), other studies were survey (4 studies), case study (1 study), longitudinal (1 study), observational (1 study), qualitative (1 study), and cohort (2 studies) study. In some studies, the type of research was not specified (4 studies).

According to the bio-ecological perspective, the obtained correlates were Grouped into five categories: child biological and demographic factors, behavioral

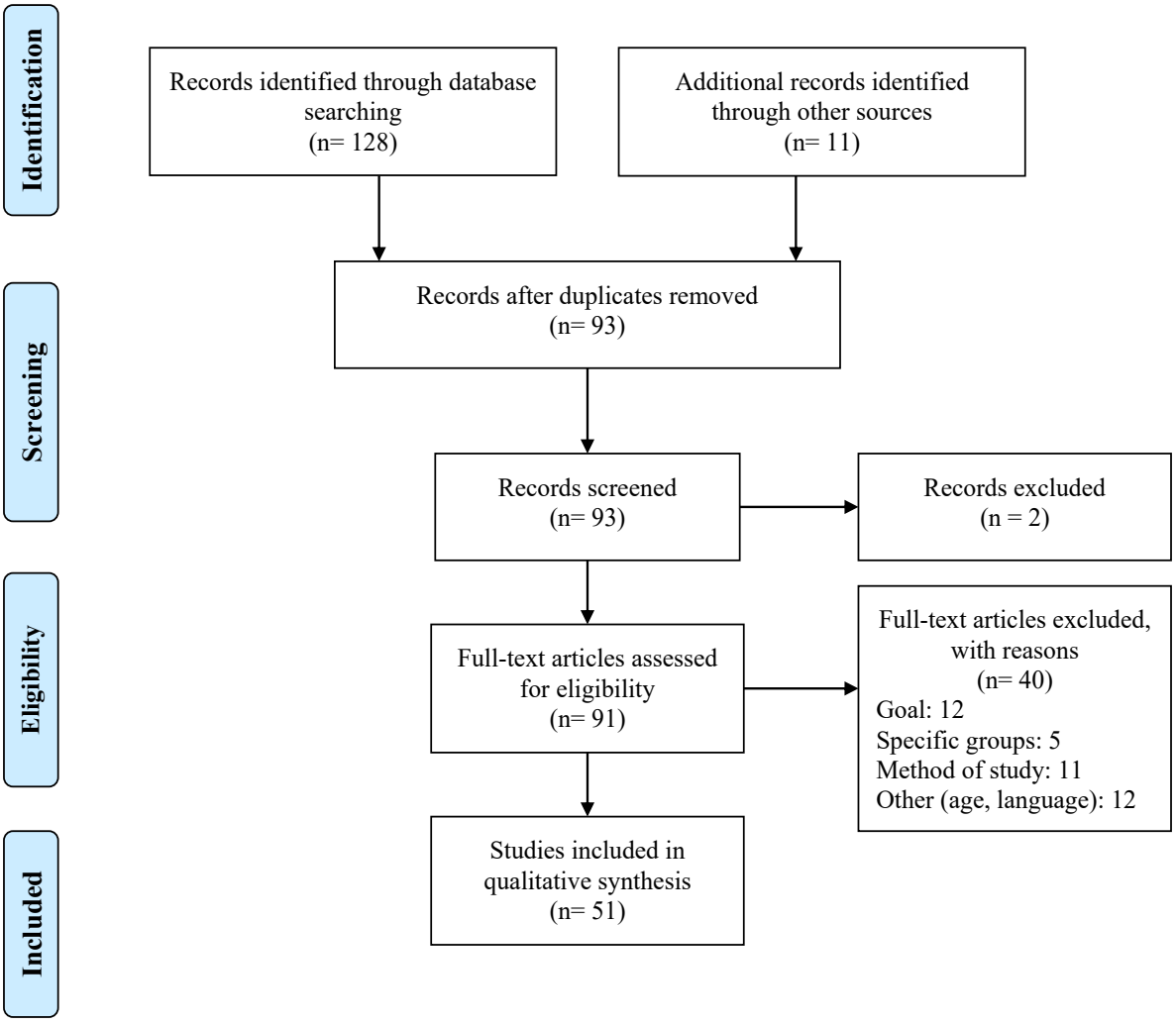

Figure 1. The flow diagram to identify the eligible articles [26]

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factors, family biological and demographic factors, family structure factors, and socio-cultural and environmental factors (Table 2).

Correlates of ST

Child biological and demographic factors

Eighteen studies had shown a positive relationship between child age and ST [20, 21, 23, 24, 31-46]. The results showed that older children had more ST. Contradictory results were obtained concerning gender so that in some studies, girls had more ST [20, 21, 31, 33, 36, 38]. However, one study found a negative relationship between the female gender and ST [47]. In some other studies, boys had more ST [37, 43, 48-54]. Only one study reported that there was no relationship between gender and ST [55]. Another study had shown that gender is generally a significant correlate for ST [56].

Only three studies examined the birth order as a correlate of ST, one of which showed no correlation [41], and the other two studies showed a correlation [43, 57]. Ethnicity [31, 37, 43, 57] and higher grades [20, 21, 48, 49] were also positive correlates. One study considered puberty status as a demographic correlate [56]. Also, children and adolescents with high BMI and abdominal fat and larger waist circumstances and those who were overweight and obese were found with more ST [3, 22, 24, 38, 41, 50-53, 56, 58, 59].

Family biological and demographic factors

Regarding the biological and demographic factors of parents, the results showed that parents' BMI and mother's weight were correlated with the children's ST [22, 50, 56]. There was a significant relationship between parents' age and the children's ST [43, 57, 59, 60]. Matarma et al. [59] showed that maternal old age and other studies showed that maternal young age was posi-

tively associated with the children's ST [57, 60]. Most studies had shown that parental education was negatively correlated with the children's ST [22, 34, 37, 43, 47, 57-59, 61]. A positive relationship with education was also found in some studies [24, 41, 44, 50, 55, 56]. Regarding the relationship between socio-economic status and the children's ST, some studies had shown a general association [62-64], some of them positive relationship [24, 30-33, 37, 38, 40, 56], and the others had shown a negative correlation [47, 57]. Only one study had shown no correlation [43].

Children of mothers with a full-time job and employed parents had more ST [37, 43, 49, 52, 54, 59, 65]. Only one study had reported a lack of correlation between parents' jobs and the children and adolescents' ST [41]. Unemployment of parents, siblings, and fathers was also correlated in two studies [46, 60]. Downing et al. [55] showed that maternal ethnicity was negatively correlated and Certain et al. [61] reported that it was positively correlated with children's ST.

Behavioral factors

Significant behavioral correlations of ST were as follows:

Perception and attitude, the priority of use (higher preference), self-efficacy, habits, and child/adolescent agreement with the rules [42, 54, 66], physical activity/movement/sports [21, 24, 32, 34, 37, 41, 47, 49, 50, 52, 55, 56, 58], sleep [24, 32, 38, 49, 55], breakfast consumption [49, 50], unhealthy and healthy food consumption [3, 23, 24, 34, 38, 47, 50, 52], eating meals and snacks in front of the TV [63, 65, 67, 68], health status [22, 34, 56], academic performance [34], daily use and ownership of DD [20, 23, 53], personality characteristics [62], behavioral-emotional problems and aggressive behaviors [23, 38, 39], feelings of worthlessness [38], having a pet [21, 22], reading a book [20], watching TV time [51, 65], and regular substance use [64].

Family structure factors

Having at least one older sibling or young child (under the age of two) at home was correlated with children's ST [33, 46]; however, Kourlaba et al. [41] had shown no significant relationship between children with and without siblings and ST. Also, single-parent children had more ST [43, 46, 60, 61].

Socio-cultural and environmental factors

The significant socio-cultural and environmental factors as correlates of the ST were as follows:

Knowing the child's friends [32], outdoor security [21, 56, 58], no friends in the neighborhood and loneliness [21, 34], neighborhood environment and quality [19, 22, 32, 37, 56, 58, 61, 67], being a victim of bullying, perception of being less social, and being popular among peers [58], sense of belonging to the neighborhood [56], living area [24, 38, 41], school location [52], urbanization [24], transportation to school [3], home quality [20, 46, 61], language spoken at home [43], parental role model [19, 66, 69], inactive parents [21, 59], non-intact family [34], family meals [19, 32], place and time of food preparation and external influences (such as planned eating and stress) [70], snack availability [63], the presence of TV and personal computer in the bedroom [3, 21, 22, 32, 46, 48, 50, 51, 60, 65, 67], the presence of toys at home [46], access to DD [19, 46], number of game consoles and TVs in the home [42, 50, 65, 66], the presence of TV in the dining room [65], having a personal computer [35, 66], internet access [30], parental self-efficacy [19, 55, 71], parental perception and attitude [22, 35, 45, 46, 51, 62, 66, 71], parental anxiety and fatigue [55], rational support and parents encouragement [22], mothers' cognition [46], family structure and parent-child communication [32], maternal unhealthy behaviors [49], the influence of parents, siblings, and friends [20, 22, 29, 42, 48, 66, 70], high frequency of television and computer use by parents [41, 45, 46, 49, 53, 55, 57, 59, 60, 63, 65, 66, 68], symptoms of maternal depression and child care [61], turning on the TV [23, 67], weather conditions [29], having a rule [22, 42, 49, 51, 55, 60, 65, 66], parental subjective norm and supervision [66], the main type of child care [31, 46, 59], lack of extracurricular activities [32], school type and its policies [3, 34], and parents' lower level of knowledge about leisure activities [37].

4. Discussion

The present review identified the correlates of ST (television, mobile phones, video games, tablets, and computers) among children and adolescents from birth to 19 years of age. Among child/adolescent biological and demographic correlates, age had been more studied. Hirsh-Yechezkel et al. [20] showed that the younger the age of onset of cell phone use, the more it will be used at later ages. This indicates that the formation of habits at a young age, in addition to being transferred to later ages, also makes it more difficult to change them. Therefore, managing the children's ST at an early age is important.

Table 1. Description of included studies

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
1	Judic et al. 2020 [21]	2179 students (boy and girl) aged 10 to 18 years	-	-	-No physical activities (+) -Not owning a pet (+) -Safe neighborhood (+) -Having inactive parents (+) -Gender (girl) (+) -Educational grade (+) -No friends in the neighborhood (+) -Having a TV in the bedroom (+) -Age (+)	Independent χ^2 Automatic Interaction Detection (CHAID) analysis	-Body composition -Total moderate-to-vigorous PA (MVPA) and ST -Sociodemographic, behavioral, and health-related characteristics -Contextual characteristics of the neighborhood and social environment
2	Gebremariam et al. 2020 [19]	706 adolescents	Cross-sectional	-	-Parental modeling of TV and movie streaming (+) -TV/movie streaming during dinner (+) -Access to screens (+) -Self-efficacy towards limiting TV and movie streaming (-) -Self-efficacy towards limiting computer/electronic game use (-) -Perceived opportunities for physical activity in the neighborhood (-)	-Linear Mixed Model -Multiple regression analysis -Univariate analysis -Linear regression analysis -Mediation analysis	-Screen-based sedentary behaviors -Parental Self-efficacy -Parental modeling -Screen viewing during meals -Parental co-viewing -Access to screens -Neighborhood safety -Neighborhood facilities for physical activity -Perceived opportunities for physical activity in the neighborhood -Parental education
3	Verloigne et al. 2015 [66]	2022 child–parent dyads aged10-12 years	Cross-sectional	-	-Higher preference of children (+) -Perception of recommendations in children and parents (+) -Lower self-efficacy (+) -Parental co-participation (+) -Longer use of television and computer by parents (+) -Having rules regarding children's television time (+) -Parental education (NA) -Number of game consoles in the household (+) -Having a computer (+) -Habit strength regarding computer use (+) -Positive attitude towards computer use (+) -Child agreement with rules (-) -Parental subjective norm (-) -Parental monitoring (-) -Physical environmental variables (NA)	Multilevel regression analysis	-ST behavior -Individual and family environmental factors
4	Carson & Kuzik 2017 [31]	149 toddlers and their parents	Cross-sectional study	PREPS questionnaire accelerometer-derived measurement	-Toddlers' age (+) -Toddlers' sex (+) -Toddlers' race/ethnicity (+) -Household income (+) -Main type of child care (-)	Simple and multiple linear regression	-Toddlers' characteristics -Parental characteristics -Physical activity and sedentary behavior -Parental reported ST

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
5	Ye et al. 2018 [48]	1063 students aged 8–19 years	-	Self-administered Screen-based sedentary Behavior (SSB) questionnaire	-Media accessibility (+) -Presence of parents/others while using screens (-) -Access to a television in students' bedrooms (+) -Gender (male) (+)	-Multiple logistic regression model -Mixed-effects model	-Sedentary Activity -Individual information -Parent/ others social factors -Media accessibility -Environmental factors -Effects of parents or other persons
6	Sisson & Broyles 2012 [32]	48505 children aged 6 to 18 years	National Survey	Telephone interviews	-Having a TV in the bedroom (+) -Higher poverty level (+) -Age (+) -Sex (+) -Extracurricular activities (+) -Physical activity (+) -Adequate sleep (+) -Family structure (+) -Family meals (+) -Knowing child's friends (+) -Parent/ child communication (+) -Neighborhood characteristics (+)	Logistic regression analysis	Individual, family, and community factors
7	Aydin et al. 2012 [33]	998 children and adolescents aged 7 to 19 years	Case-control study	-	-Age (+) -Sex (+) -Older Siblings (+) -Highest socioeconomic status (+)	Multiple linear regression model	-Age -Sex -Socioeconomic status
8	Wang et al. 2018 [34]	23 543 students in grades 7–12	Cross-sectional	Youth risk behavior survey	-Older age (+) -Attendance at vocational high school (+) -Non-intact family (+) -Poor academic performance (+) -Bad self-reported health status (+) -Loneliness (+) -Drinking carbonated beverages ≥3 times every day (+) -Attendance at academic high school (-) -Higher parental education (-) -Being physically active (-)	Multivariable logistic analysis	-ST -Parental education level -Parental marital status -Academic performance -Loneliness and physical activity -Breakfast behavior -Intake of fruits -Vegetables and carbonated beverages
9	Allahverdipour et al. 2010 [35]	444 adolescents	Cross-sectional	-General Health Questionnaire (GHQ-28) -Orpinas' aggression scale	-Aggressive behaviors (+) -Older age (+) -Perceived less serious side effects of video gaming (+) -Have personal computers (+)	Multiple binary logistic regression -bivariate analysis and chi-square test	-Demographics and video-game playing -Mental health status -Perceived side effects of video/ computer games -Aggression
10	Downing et al. 2017 [55]	937 children aged 3 to 7 years	Cohort	-	-Sex (NA) -Sleep duration (-) -Parental self-efficacy (-) -Paternal education (+) -Parents reporting that they get bored watching their child play a game (-) -ST rules (-) -Maternal ethnicity (-) -Child preferences for sedentary behavior (+) -Parental concerns about child's physical activity and sedentary behavior (-)	Multivariable linear regression analysis	-Biological and demographic variables -Child behavioral variables -Psychological variables

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
11	LeBlanc et al. 2015 [74]	567 children aged 10 years	Cross-sectional	-Demographic and family history questionnaire -Child report: food frequency questionnaire: -Child report: ISCOLE Diet and lifestyle questionnaire -Parent report: ISCOLE neighborhood and home environment questionnaire	-Waist circumference (+) -Number of TVs at home (-) -Mother's weight status (+) -Father's education (+) -Unhealthy eating pattern score (+) -Healthy eating pattern score (-) -Weekend breakfast consumption (-)	-Multilevel general linear models -Unpaired t-tests and chi-square test	-Anthropometric and biological variables -Family situation -Parents and Home environment -Behavioral characteristics -Self-reported ST
12	Certain et al. 2002 [61]	3585 children aged 0 to 35months old	Cross-Sectional	Home observation for measurement of the environment	-Maternal race (+) -Lower maternal education (+) -Unmarried mother (+) -Maternal Depressive Symptoms (+) -Center-based child care (-) -Poor neighborhood quality (+)	-Chi-square test and t-test -Multivariate logistic regression models	-Child Care -Maternal Depressive Symptoms -Neighborhood Quality
13	Garcia et al. 2016 [58]	1509 children aged 9 years	Cross-Sectional	-	-BMI (+) -Moderate-to-Vigorous PA (MVPA) (+) -Access to an environment for playing (+) -Being a victim of bullying (+) -Perceiving yourself as less social (+) -Lower parental education (+) -Low participation in activities (+) -Identifying yourself as popular among your peers (+) -Less access to an environment for playing (+) -Less perception of safety (+) -Lack of playgrounds nearby (+)	Multiple regression analysis	-Individual factors -Physical Activity -Social factors -Environmental factors
14	Bernard et al. 2017 [57]	910 children aged 2 to 3 years	Cohort	-	-Younger maternal age (+) -Lower maternal education (+) -Longer parental television time (+) -Ethnicity (+) -Birth order (+) -Low household income (+)	Multivariable linear mixed-effects models	-Sociodemographic and health information -Screen viewing time
15	Hume et al. 2010 [53]	338 adolescents aged 14 years	Cross-sectional	Activity Questionnaire for Adolescents and Adults (AQuAA)	-High television viewing habit strength (+) -Parents' Parents and Home environment watching (+) -Overweight/obesity (+) -High computer use (+)	Logistic regression analysis	-Individual factors -Social factors -Physical environmental factors -Television viewing -Weight status

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
16	Yamada et al. 2018 [49]	1659 Children aged 6 to 13 years	Cross-sectional	Breslow's seven health behaviors	-Higher grade (+) -Skipping breakfast (+) -Gender (male) (+) -Staying up late (+) -No physical activity (+) -Father's internet use ≥2 hours/day (+) -Mother's prolonged internet use ≥2 hours/day (+) -Mothers with unhealthy behaviors (+) -No rule setting governing ST (+) -Mothers with full-time employment (+)	Logistic regression analysis	-Parental lifestyle -Employment status -Family affluence and internet use -Children's lifestyle and obesity
17	Lee et al. 2017 [36]	41038 adolescents aged 13 to 18 years	Cross-sectional	-	-Older age (+) -Female gender (+) -Being non-White (+) -⩾$6 of allowance (+)	-Chi-squared tests -Linear and logistic regression analyses	-Moderate-to-vigorous PA (MVPA) -Sociodemographic factors -Participation in organized sports -Sedentary behavior
18	Allen & Vella 2015 [56]	3956 children aged 4 to 13 years	Cross-sectional	-	-Sex (+) -Pubertal status (+) -General health (+) -BMI (+) -Neighborhood socioeconomic status (+) -Household income (+) -Parental education (+) -Parental BMI (+) -Neighborhood belonging (+) -Neighborhood safety (+) -Neighborhood facilities (+)	-Bivariate correlations -Multiple regression analysis	-ST -Sports participation
19	Babey et al. 2013 [37]	4029 adolescents aged 12 to 17 years	Cross-sectional	-	-Male gender (+) -American Indian and African American race (+) -Lower household income (+) -Lower levels of physical activity (+) -Lower parent educational attainment (+) -Additional hours worked by parents (+) -Older age (+) -Asian race (+) -Higher household income (+) -Lower levels of physical activity (+) -Lower level of parental knowledge about free time activities (+) -Living in neighborhoods with higher proportions of non-white residents -Higher proportions of low-income residents (+)	Linear regression analysis	-Sociodemographic factors -Family characteristics -Environmental characteristics
20	Bounova et al. 2016 [67]	1141 adolescents aged 13 to 15 year s	Survey	-International obesity task force -Adolescent Sedentary Activities Questionnaire (ASAQ)	-Having meals while watching television (+) -Having a television in the bedroom (+) -Have a personal computer in the bedroom (+) -Neighborhood environment that supports physical activity	-Logistic regression analysis -Two-way multivariate analysis of variance -Chi-squared test -Independent sample t-test	-Sociodemographic factors -BMI -ST

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
21	LeBlanc et al. 2015 [50]	5844 children aged 9 to 11 years	Cross-sectional	-Diet and lifestyle questionnaire -Demographic and family history questionnaire -Neighborhood and home Environment questionnaire	-Poor weight status (+) -Not meeting physical activity guidelines (+) -Having a television or computer in the bedroom	-Multilevel general linear models -Unpaired t-tests -Chi-squared test	-Accelerometer measured sedentary time -Self-reported ST
22	Schaan et al. 2018 [30]	66706 adolescents aged 12 to 17 years	Cross-sectional	-	-Socioeconomic status -Hhaving a computer with internet access	Poisson regression	-Socioeconomic status -ST
23	Lauricella et al. 2015 [45]	2300 parents of children aged 0–8 years	Survey	-	-Parents' ST -Parental attitudes -Age	-Linear regression analysis -ANOVA	-Parents' demographics -Child's demographics -Attitudes -ST
24	Bauer et al. 2011 [69]	253 mother-daughter dyads	Cross-sectional	-	-Parental modeling of television (+)	Hierarchical linear regression models	-Family Physical Activity Environment -Family environment measures -Family Television use and Environment -Food types -Soft drink use -Fruits and vegetables intake -BMI -Physical activity and television use -Body composition
25	Mozafarian et al. 2017 [38]	14880 students aged 6–18 years	Survey	-Questionnaire of the World Health Organization -Global student health survey	-Socioeconomic status(+) -Eating junk foods (+) -Urban residence (+) -Age (+) -Increased number of children (-) -Obesity (+) -Sense of worthlessness (-) -Aggressive behaviors (+) -Insomnia (+)	Logistic regression analysis	-Anthropometric measurements -Socio-demographic -Physical activity -Psychiatric distress -ST behavior -Dietary habits
26	Guedes et al. 2018 [24]	17000 children at school age	Cross-sectional	-Youth Risk Behavior Survey (YRBS) -Physical Activity Questionnaire (PAQ-A) for adolescents -Physical Activity Questionnaire (PAQ)-for older children 1	-Age (+) -Economic status (+) -Mother's education (+) -Living environment (+) -Urbanization (+) -Less physical activity (+) -Low fruit/vegetable intake (+) -Consuming sweetened products/soft drinks (+) -Fewer hours of sleep (+) -Excess body weight (+) -Abdominal fat (+)	-Bivariate analysis -Hierarchical multiple regression	-ST -BMI -Demographic characteristics -Sleep duration

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
27	Trofholz et al. 2019 [70]	150 children aged 5 to 7 years	-	-	-Number of adults present (+) -Living environment (+) -External factors (planned meal and stress) (+) -Time to prepare the meal -Eating meal on weekend or a weekday (NA) -The type of food served (egg, homemade and fast food) (NA) -The person preparing the meal (NA) -The number of children (NA)	Adjusted generalized estimating equations	Ecological Momentary Assessment variables
28	Ozmert et al. 2002 [39]	888 students and parents	Cross-sectional	Child Behavior Checklist (CBCL)	-Social and school achievement (-) -Not wanting to communicate with other people (+) -Social problems (+) -Difficulty in thinking (+) -Attention difficulty (+) -Delinquent behavior (+) -Aggressive behavior (+) -Externalization (+) -Gender -Age	-t-test -Pearson correlation test -Partial correlation test -One-way analysis of variance -Stepwise logistic regression	-Child behavioral problems -Child demographic variables
29	Lampard et al. 2013 [71]	147 children aged 2 to 6 years	Cross-sectional	Limiting sedentary activities subscale of the activity support scale	-Greater self-efficacy to restrict ST (-) -Greater perceived importance of restricting child screen use (-) -Parents' beliefs about the health risks of screen use (NA) -Positive beliefs about screen use (NA)	Structural equation modeling (SEM)	-Family demographic characteristics -ST in parents and children -Parental restriction -Social-cognitive factors -BMI
30	Jusien˙e et al. 2019 [23]	847 children aged 2 to 5 years	Cross-sectional	Child behavior checklist	-Overall daily screen time (+) -Television on in the background (+) -Consumption of junk foods (+) -Child age (+) -Emotional and behavioral problems (+)	Multinomial logistic regression	-Screen use during meals -Overall daily screen use -Background television usage -Frequency of child's consumption of junk food -Emotional and behavioral problems -Child BMI -Maternal and paternal education -Sibling status
31	Inyang et al. 2010 [62]	317 students aged 10 to 14 years	Cross-sectional	Eysenck Personality Questionnaire – junior form (EPQ-J)	-Personality traits (+) -Parental socioeconomic status (+) -Perceived health risks of MP (+)	Univariate logistic regression	-Personality traits -Parental socioeconomic status -School system -Sociodemographic characteristics
32	Downing et al. 2019 [22]	498 child- parent dyads aged 3 to 5 years	Cross-sectional	-	-Television in the child's bedroom (+) -Parental logistic support (+) -Encouragement of parents (+) -Co-participation in ST (+)	Mixed-effect regression models	-

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
33	Cillero et al. 2010 [28]	503 students mean age: 10 years	Cross-sectional	-	-Greater access to bedroom media sources (+) -Single-parent family (+) -Having a younger parent (+) -Unemployed father and siblings (+) -Parental television watching time (+) -Parental rules (-)	Logistic regression analysis	-Sociodemographic status -BMI -ST
34	Hirsh-Yechezkel et al. 2019 [20]	1688 adolescents in seventh and ninth grade	Cross-sectional	-	-Gender (girls) (+) -Educational grade (+) -Attending religious schools (-) -Leisure time activities (computer use, visiting friends, reading books) (+) -Socio-demographics (+)	Unconditional logistic regression	-Mobile phone use -Sociodemographic characteristics -Leisure time activities
35	de Moraes Ferrari et al. 2019 [3]	328 children aged 9 to 11 years	Cross-sectional	-Diet and lifestyle questionnaire -School environment questionnaire, -Neighborhood questionnaire -Demographic and Family Health questionnaire	-BMI (+) -Healthy dietary pattern (+) -Television in the bedroom (+) -Transportation to school (+) -Physical activity policies or practice at school (+)	-Multilevel linear regression analysis -t-test	-ST -Anthropometric factors -Accelerometry
36	de Lucena et al. 2015 [40]	2874 adolescents aged 14-19 years	Cross-sectional	-	-Higher economic class (+) -Age (+) -Gender (male) (+) -Physical activity (NA) -Nutritional status (NA)	-Chi-squared test -Logistic regression analysis	-Excessive ST -Physical activity -Sociodemographic variables -Nutritional status
37	Munaro et al. 2016 [47]	1163 adolescents aged 14 to 20 years	Cross-sectional	-	-Mother's education (+) -Lower fruit consumption (+) -Gender (female) (-) -Low income -Insufficiently active (+)	-Chi-squared test -Logistic regression analysis	-Sociodemographic variables -Lifestyle variables
38	Birken et al. 2011 [65]	157 children aged 3 years	Observational	-	-Eating lunch and dinner in front of the screen -Employed mother (+) -Parental ST (+) -Family rule (-) -Higher number of television sets in the home (+) -Television in the child's bedroom (+) -TV viewing at mealtime (+) -TV viewing in the morning (+)	-Linear regression models -Multivariable models	-Child and family demographics -Parental screen-viewing factors
39	Kourlaba et al. 2009 [41]	2374 children aged 1 to 5 years	Cross-sectional	-	-Parental television watching time (+) -Region of residence (+) -Maternal educational status (+) -Maternal television watching time (+) -Children's BMI status (+) -Physical activity (+) -Birth order (NA) -Siblings (NA) -Mothers' employment (NA)	Multiple logistic regression	-Television viewing assessment -Physical activity assessment -Anthropometric measurements -Demographic characteristics

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
40	De Decker et al. 2011 [29]	122 children aged 4 to 6 years	Qualitative	-	-Influence of siblings or friends (+) -Weather conditions (+) -Parental habits at home (+)	Qualitative content analysis	-Parents' perceptions about television viewing -Influences of siblings, friends, and other home-related factors -Physical activity -Dietary intake
41	Granich et al. 2011 [51]	297 children aged 11 to 12 years	Cross-sectional	-	-Watching television during breakfast and after school (+) -Watching television with mother (+) -No rule(s) limiting time for computer game usage (+) -Having multiple digital devices in the bedroom (+) -BMI (+) -Gender (male) (+) -Watching television in the evening and late at night (+)	Logistic regression analysis	-Individual Measures -Home Environment and Electronic devices available at home -Socio-demographic factors
42	Ham et al. 2013 [52]	370 children	Cross-sectional	Pros and Cons of exercise -measurement of exercise self-efficacy	-Gender (male) (+) -Higher BMI (+) -Fast food consumption (+) -Physical activity (+) -Employed mother (+) -School located in the city center (+)	-One-way ANOVA -Chi-squared test -Multinomial logistic regression analysis	-Self-Efficacy -Eating Behaviors -ST -Sleep Duration -Stress -Pros and Cons of physical activity
43	Cillero et al. 2011 [42]	503 school-aged children and their parents	Cross-sectional	-	-Lower self-efficacy (+) -Stronger sedentary Group-norms (+) -Stronger social reasons (+) -Parental screen-viewing rules (+) -Family co-viewing practices (+) -Age (+) -Gender (male) (+)	Logistic regression model	-Screen viewing -Individual factors -Social factors -Sociodemographic information
44	Ngantcha et al. 2018 [64]	3720 adolescents aged 11 to 15 years	Cross-sectional	-Family Affluence Scale (FAS) adolescent -Depression rating scale -Cantril scale	-Lower life satisfaction (+) -Less physical activity (+) -Active school bullying (+) -Grade repetition (+) -Regular substance use (+) -Socioeconomic status(+)	Structural Equation Model (SEM)	-Schooling conditions -Health-related status -Socioeconomic status
45	Vaala & Hornik 2014 [46]	698 mother of children aged 3 to 24 month	Cross-sectional	-	-Toy index (+) -Having a television in the child's bedroom (+) -Mother's unemployment (+) -Child age (+) -Mother's own television / video viewing (+) -Childcare using television / videos (+) -Having another child 3–24 months of age (+) -Number of non-traditional sources for the child's video-viewing (+) -Use of childcare (-) -Mothers' structural circumstances (+) -Mothers' knowledge (+)	-Ordinary Least Squares (OLS) -Regression models	-Structural life Circumstances variables -Cognitive constructs -Child's television / video viewing -Demographics

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
46	Pearson et al. 2018 [63]	126 children aged 5 to 6 years	Cross-sectional	-Adolescent Sedentary Activity Questionnaire (ASAQ) -Food Frequency Questionnaire (FFQ)	-Family income (+) -Eating meals and Energy-Dense (ED) snacks while watching television (+) -Parental ST and ED snack food consumption (+) -Availability of ED snack foods at home (+)	Multivariable multinomial logistic Regression	-Child eating behaviors -Physical environmental factors -Behavioral factors -Child ST
47	Anand & Krosnick 2005 [43]	1065 parents and children aged 6 months to 6 years	-	-	-Child's age (+) -Race (+) -Parents' education (+) -Parents' marital status (+) -Child's gender (+) -Birth order (+) -languages spoken at home (+) -Parents' employment status (+) -Parents' age (+) -Family income (NA)	Multiple regression analysis	Socio-demographic characteristics
48	Pearson et al. 2017 [68]	527 adolescents aged 11 to 12 years	Cross-sectional	-Food frequency questionnaire -Adolescent Sedentary Activity Questionnaire (ASAQ) -Self-Report Behavioral Automaticity Index (SRBAI) -Child feeding questionnaire	-Eating ED snacks while watching television (+) -Eating while watching television with parents (+) -The availability and accessibility of ED snack foods at home	Multivariate multinomial logistic regression	-Eating behaviors -Demographic, individual, behavioral, social, and physical factors -ST
49	Matarma et al. 2016 [59]	634 children aged 13 months	Longitudinal	-	-Father's longer duration of sitting time -Parents' physical activity (NA) -Mother's advanced education (-) -Mother's younger age (-) -Mother's lower ST (-) -The child attending daycare (-) -The child's lower BMI (-)	Linear mixed models	-Demographic characteristics -Behavioral characteristics -Anthropometric measures

No.	Author & Year	Sample Size & Age Group	Study Design	Measurements	Correlates	Statistical Analysis	Measured Variables
50	Bickham et al. 2003 [44]	1819 children aged 11 to 12 years	-	-Home Observation for Measurement of the Environment (HOME)-short form -Short form of the composite international diagnostic interview -Rosenberg self-esteem scale	-Parental education (+) -Age of the child (+) -Gender (+)	-Ordinary least squares -Hierarchical regression	-Child demographic Characteristics -Socioeconomic resources and neighborhood environment -Family environment -Parents' psychological well-being
51	Shokrvash et al.s 2013 [54]	402 adolescents aged 11 to 14 years	Descriptive-analytical	Adolescent Physical Activity and Recall Questionnaire (APARQ)	-Gender (male) (+) -Employed mother (+) -Low perceived self-efficacy (+) -Perceived family support (NA) -VMPA (NA) -Mothers' marital status (NA) -Mothers' educational level (NA)	Logistic regression analysis	-Self-efficacy -Family support -SD behavior -VMPA

NA: Non-Associations; +: Positive correlation; - : Negative correlation.

Older children were more likely to use screen media devices compared with their younger counterparts. This finding is consistent with the other systematic reviews of traditional ST use among three-year-old children and younger [72] and mobile screen media use among children aged 0–8 years [73]. With age, the type of DD used changes, and children/teens with a higher educational level are more likely to use cell phones, tablets, and computers. Contradictory results were obtained regarding parental education and child/adolescent ST. Some studies have considered a low level of parental education and some considered higher education as a factor for more ST. This may be due to the interest of parents with higher education in educating their children through screen media, which was mentioned in only one study [44], or due to the busy schedule of parents and their employment. Also, the ST showed an increase in children with young and elderly parents. The socio-economic status of the family in 9 studies had a positive relationship with child/adolescent ST and only three studies showed a negative relationship; an essential factor could be the greater access of children/adolescents to DDs and their diversity in families with better economic status. Children/adolescents who had an older sibling were found with increased ST, which may indicate the modeling in younger children; this finding is consistent with the systematic review of Paudel et al. [73]. In general, the role-modeling of parents or siblings is an essential factor in shaping children's behavior in individual and mutually adjusted models. Parents' physical activity patterns, television use, alcohol use, and fruit and vegetable consumption were consistently correlated with adolescent girls' behavior [69]. Therefore, modeling can be considered as a suitable solution to reduce ST in children and adolescents.

Poor academic performance, junk foods, skipping breakfast, sleeping late, eating in front of the TV, lack of physical activity, and negative attitudes toward movement can all be correlated with the ST. In most cases, a positive [negative] correlation with exercise causes a negative [positive] correlation with the total ST. Pet ownership has been examined in two studies; Downing et al. [22] showed that boys with pets had more ST during the week, but Júdice et al. [21] found that people with pets had less ST because they had more time to walk with their pet. Adolescents who considered their health at a good level and had a positive perception of it had less ST. Adolescents/children who watch TV in the morning, at night, and after school, those have their own DD, those who feel worthless, and also adolescents/children with behavioral problems and aggressive behaviors are more likely to watch TV excessively. Adolescents with extroverted personality traits use cell phones more frequently, and adolescents with psychotic personality traits regularly use cell phones [62]. The ST is more common in children/adolescents who have less health-oriented behaviors.

Among the socio-cultural and environmental factors, neighborhood quality, the presence of DD in the bed-

Table 2. A summary of the correlates

Correlates of Screen Time	
Child biological and demographic factors	Child age [20, 21, 23, 24, 31-46]
	Birth order [43, 57]
	Ethnicity [31, 37, 43, 57]
	Grade [20, 21, 48, 49]
	Puberty status [56]
	BMI [3, 22, 24, 38, 41, 50-53, 56, 58, 59]
Family biological and demographic factors	Parents' BMI [22, 50, 56]
	Parents' age [43, 57, 59, 60]
	Parents' education [22, 24, 34, 37, 41, 43, 44, 47, 50, 55-59, 61]
	Socio-economic status [24, 30-33, 37, 38, 40, 47, 56, 57, 62-64]
	Employed parents [37, 43, 49, 52, 54, 59, 65]
	Unemployed parents [46, 60]
	Maternal ethnicity [55, 61]
Behavioral factors	Perception/attitude, priority of use, child/adolescent agreement [42, 54, 66]
	Physical activity [21, 24, 32, 34, 37, 41, 47, 49, 50, 52, 55, 56, 58]
	Sleep [24, 32, 38, 49, 55]
	Breakfast consumption [49, 50]
	Unhealthy/healthy foods [3, 23, 24, 34, 38, 47, 50, 52]
	Eating meals in front of television [63, 65, 67, 68]
	Health status [22, 34, 56]
	Academic performance [34]
	Daily use and having digital devices [20, 23, 53]
	Personality [62]
	Behavioral-emotional problems [23, 38, 39]
	Worthlessness [38]
	Pet ownership [21, 22]
	Reading book [20]
	Television time [51, 65]
	Substance use [64]
Family structure factors	Sibling [33, 46]
	Single-parent families [43, 46, 60, 61]

Correlates of Screen Time	
Socio-cultural/ environmental factors	Knowing the child's friends [32]
	Outdoor security [21, 56, 58]
	Lack of friends [21, 34]
	Neighborhood environment and quality [19, 22, 32, 37, 56, 58, 61, 67]
	Being a victim of bullying/popular [58]
	Belonging to the neighborhood [56]
	Place of residence [24, 38, 41]
	School location [52]
	Urbanization [24]
	Transportation to school [3]
	Home quality [20, 46, 61]
	Language spoken at home [43]
	Parental role model [19, 66, 69]
	Inactive parents [21, 59]
	Non-intact family [34]
	Family meals [19, 32]
	Place and time of food preparation [70]
	Snack availability [63]
	Television and personal computer in the bedroom [3, 21, 22, 32, 46, 48, 50, 51, 60, 65, 67]
	Toys at home [46]
	Access to digital devices [19, 46]
	Number of game consoles and televisions [42, 50, 65, 66]
	Television in the dining room [65]
	Personal computer [35, 66]
	Internet access [30]
	Parental self-efficacy [19, 55, 71]
	Parental perception and attitude [22, 35, 45, 46, 51, 62, 66, 71]
	Parental anxiety and fatigue [55]
	Rational support and encouragement of parents [22]
	Cognition of mothers [46]
	Family structure and parent-child communication [32]
	Maternal unhealthy behaviors [49]
	Influence of others [20, 22, 29, 42, 48, 66, 70]
	Parents' screen use [41, 45, 46, 49, 53, 55, 57, 59, 60, 63, 65, 66, 68]
	Maternal depression [61]
	Television on [23, 67]
	Weather conditions [29]
	Having a rule [22, 42, 49, 51, 55, 60, 65, 66]
	Parental subjective norm and supervision [66]
	Type of child care [31, 46, 59]
	Extracurricular activities [32]
	School and its policies [3, 34]
	Parents' knowledge of leisure time activities [37]

room, the length of ST in parents, and the rules to control ST, had been more considered in studies. Children were more likely to had increased ST in families who use more DDs, such as cell phones and televisions, which is consistent with the systematic review of Cillero and Jago [28]. More use of parents and other family members, in addition to modeling, is a motivating factor to use these devices excessively by children/adolescents. Children of parents who had rules regarding their children will also have less ST and fewer parental ST rules are also related to higher ST [28]. In studies considering a rule as a correlate, the minimum and maximum ages of children were 3 and 13 years old. Therefore, it can be said that having a rule in this age range can be used as a solution to control the ST. Considering the cognitive development of children under the age of three who do not understand the rule as well as adolescents over the age of 13 who are more influenced by social factors, such as friends and peers, it seems better to use other solutions.

The characteristics of the neighborhood, socio-economic status of it, safety, facilities, the possibility of physical activity and sport in it, neighborhood restrictions for movement, and the lack of sense of belonging to the neighborhood are important factors affecting ST in children/adolescents. Consistent with these results, Cillero and Jago [28] showed less perceived safety in neighborhoods related to increased ST. The existence of playgrounds, parks, and facilities, as well as the attitude and perception of parents about the safety of the outdoor environment, play an essential role in encouraging people to play and perform physical activities outside the home; thus, living in neighborhoods where physical activity is possible, negatively predicts the ST in adolescents. Also, living in neighborhoods with low socioeconomic status, higher levels of poverty, and the presence of schools in low-income areas of the city were associated with obsessive ST. Students whose homes are farther away from school and use active travel options to get to school (walking or cycling) had less ST. Urbanization has also provided access to various DDs, various television networks, and high-speed internet, which is a factor in increasing the ST. In families with ST during meals or with a TV in the dining room, inactive parents, different DDs at home, and internet access, the children/adolescents had more ST. Children and teens who had TV/computer/game consoles in their bedrooms used them more. The ease of access without parental supervision can be the reason for the increase in ST.

The ST in children/adolescents seems to be the result of interaction between parents and child-related factors and is strongly influenced by parents' attitudes and beliefs about the positive and negative features of ST, and parents' self-efficacy in limiting television/video, limiting computer/electronic games, supporting the child's physical activity, unhealthy behaviors of the mother, parental fatigue and anxiety, encouraging and supporting by parents, and parental involvement in ST. Regarding parental involvement, Downing et al. [22] showed that ST in girls during the week and weekend was negatively associated with maternal participation in electronic games, while it was positively associated with sibling participation in electronic games. Children/adolescents who visit their friends for more than two hours a day, students of higher grades, and girls use mobile phones. Students who studied for more than half an hour a day were less likely to use a cell phone. Younger children often join their siblings or friends to watch TV, making it impossible for parents to legislate [29]. Concerning the relationship between child care at childhood (child care center, daycare, and parental care) and playing video/computer games, the results showed that going to child care centers reduced ST. Matarma et al. [59] also showed that going to daycare centers is associated with a smaller increase in the use of video/computer games in the child. The child's presence in these centers leads to joint non-digital activities with peers and spend more time playing physical games. In contrast, the ST at home can be a factor for the child's entertainment and provide more time for parents to do their activities.

In general, it can be said that the bio-ecological model indicates that human behavior is influenced by intrapersonal, interpersonal, and socio-cultural factors that interact to shape our behavior. Findings also showed that in younger children, family-related factors, such as parents, home environment (easy access, presence of DDs in the bedroom, parental pattern, and parental rules) can have a more significant effect on the formation of their behavior. With age, the impact of social, physical, and environmental factors becomes more and more. Factors, such as the quality of the neighborhood and its facilities, the effects of peers and friends, Group norms, outdoor safety, poverty, and intrapersonal factors, such as adolescents' perception, attitude, and self-efficacy, physical activity, habits and priorities, and personality and psychological characteristics are influential. Also, a set of these factors can interact and increase or decrease the impact rate.

5. Conclusion

Excessive ST in children/adolescents has many adverse effects on various aspects of their development. The present review showed that many factors (intrapersonal, interpersonal, cultural, and social) could affect

ST in children/adolescents. Our study also showed that these factors could be different in childhood and adolescence. The ST can be formed under the influence of social and cultural environmental factors in addition to individual and family factors and is intensified at later ages; therefore, paying attention to correlated factors can be important in the study of this phenomenon and the use of strategies to manage it. Also, the present study showed that the ST increases with age; thus, it seems that the use of interventions at preschool age can be a preventive and effective solution.

Methodological limitations of the studies reviewed

A significant limitation of the studies reviewed was the lack of objective measures to assess children's media use with parental proxy reports used in all studies. This approach may underestimate or overestimate accurate exposure because of recall bias, social desirability bias, or simply not being aware of screen viewing behaviors. Lack of accurate and coherent definition of ST and lack of specification of the type of ST in most studies can affect the findings' validity. Besides, the kind of child/adolescent ST (educational/non-educational) had not been studied. In some studies, the ST had not been considered as a separate variable and had been studied along with variables, such as snack use, fruit and vegetable consumption, and sedentary behaviors, which makes it challenging to separate correlates associated with the ST and other variables. Also, most studies were cross-sectional; thus, the causality between variables cannot be deduced.

Implications for future research and practice

According to this study, further studies on correlates that could be used to design future interventions can be done. For future studies, it is essential to consider a multidimensional approach and use social/cultural environmental factors in addition to individual and family factors, as well as use interventions at a younger age. To be more effective, future interventions should consider the affecting correlates in different Group ages and design the interventions based on them.

Ethical Considerations

Compliance with ethical guidelines

The study was a part of a project that was approved by the Ethics Committee of Tarbiat Modares University (Code: IR.MODARES.REC.1398.062).

Funding

This research was a part of a project that received funding from the Iran National Science Foundation (No.: 98017358).

Authors contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors confirm their consent for publication.

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