

# Parental modelling, media equipment and screen-viewing among young children: cross-sectional study

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## ABSTRACT

**Objective:** To examine whether parental screen-viewing, parental attitudes or access to media equipment were associated with the screen-viewing of 6-year-old to 8-year-old children.

**Design:** Cross-sectional survey.

**Setting:** Online survey.

**Main outcome:** Parental report of the number of hours per weekday that they and, separately, their 6-year-old to 8-year-old child spent watching TV, using a games console, a smart-phone and multiscreen viewing. Parental screen-viewing, parental attitudes and pieces of media equipment were exposures.

**Results:** Over 75% of the parents and 62% of the children spent more than 2 h/weekday watching TV. Over two-thirds of the parents and almost 40% of the children spent more than an hour per day multiscreen viewing. The mean number of pieces of media equipment in the home was 5.9 items, with 1.3 items in the child's bedroom. Children who had parents who spent more than 2 h/day watching TV were over 7.8 times more likely to exceed the 2 h threshold. Girls and boys who had a parent who spent an hour or more multiscreen viewing were 34 times more likely to also spend more than an hour per day multiscreen viewing. Media equipment in the child's bedroom was associated with higher TV viewing, computer time and multiscreen viewing. Each increment in the parental agreement that watching TV was relaxing for their child was associated with a 49% increase in the likelihood that the child spent more than 2 h/day watching TV.

**Conclusions:** Children who have parents who engage in high levels of screen-viewing are more likely to engage in high levels of screen-viewing. Access to media equipment, particularly in the child's bedroom, was associated with higher levels of screen-viewing. Family-based strategies to reduce screen-viewing and limit media equipment access may be important ways to reduce child screen-viewing.

## BACKGROUND

Screen-viewing (SV; watching TV, playing games consoles, surfing the internet, using

## ARTICLE SUMMARY

### Article focus

- Examine the associations between the screen-viewing patterns of young children (6-year-olds to 8-year-olds) and their parents.
- Examine whether parental attitudes or access to media equipment were associated with the screen-viewing of young children.
- Examine if associations differed by screen-viewing type.

### Key messages

- Over two-thirds of the parents and 40% of the children spent more than an hour per day multiscreen viewing.
- Children who have parents who engage in each form of screen-viewing are more likely to engage in the behaviour.
- Presence of media equipment, particularly in the child's bedroom, is associated with higher levels of screen-viewing among young children.

### Strengths and limitations of this study

- The major strengths of this study are the provision of information on the screen-viewing behaviours of young children and their parents in a relatively large sample of UK children.
- The major limitation is the study design which meant that data were collected from an anonymous survey in which participants were recruited via a parenting website.
- The study is also limited because the survey was on parental reports of parent and child screen-viewing.

smart-phones) has been associated with higher levels of cardiovascular risk factors among children and adults.<sup>1-3</sup> In recently updated guidance, the American Academy of Pediatrics (AAP) recommends that 'Pediatricians should counsel parents to limit total non-educational screen-time to no more than 2 h per day'.<sup>4</sup> Similarly, the four UK Chief Medical Officers recommend that all children and adults should limit overall sedentary time but do not

recommend a threshold.<sup>5</sup> Data from the 2008 Health Survey for England indicate that over 45% of boys and 47% of girls in England spend more than 3 h a day watching TV on weekdays.<sup>6</sup> It was recently reported that 10-year-olds to 11-year-olds engage in multiscreen viewing in which multiple devices such as TVs, smart-phones, laptops and handheld gaming devices are used concurrently.<sup>7</sup> This research also showed that although TV viewing is often a key component of multiscreen viewing, it is usually not the dominant behaviour. As such, it is important to study a broader range of SV modalities. Furthermore, SV patterns differ by age and gender<sup>8</sup> and track from childhood to adulthood,<sup>9</sup> suggesting that strategies to reduce childhood SV are needed.

Behaviour change is facilitated by identifying and modifying causal predictors of target behaviours.<sup>10–11</sup> High levels of parental TV viewing are associated with high levels of TV viewing among 10-year-old to 11-year-old UK children,<sup>12</sup> but we do not know whether this modelling effect holds for younger children. Qualitative research has suggested that many parents view SV as valuable parent and child time,<sup>13</sup> a form of childcare (or babysitter),<sup>14</sup> a source of education<sup>15</sup> and as a means of relaxation for their child.<sup>16</sup> It may therefore be the case that parental attitudes towards these issues are associated with the child's SV. Obtaining information on these associations is important because if there is some evidence of an association, strategies to change these variables could form part of the intervention approaches.

The electronic media environment<sup>8–17</sup> within the home, such as access to media equipment, may be another important predictor of SV. While access to a TV in the bedroom has been associated with TV viewing among older children and adolescents, the data for young children have been equivocal<sup>18</sup> and there is a lack of data among UK samples. Taken together, previous research suggests that parental modelling may be important predictors of child SV; that is, parental attitudes and multiscreen viewing habits may predict child SV behaviours. Understanding the associations between the parent attitudes and behaviours and child behaviours could be critical for designing the next generation of interventions to decrease child SV.<sup>11</sup>

The aims of this study were to examine: (1) associations between the SV patterns of young children (6-year-olds to 8-year-olds) and their parents; (2) whether parental attitudes or access to media equipment were associated with the SV of young children and (3) if associations differed by SV type.

## METHODS

Participants were recruited via an advertisement on the message boards of a UK parenting website (Netmums). The advertisement sought parents of 6-year-old to 8-year-old children who would be willing to complete a short, anonymous online survey. Participants were informed that by completing the survey, they were

consenting to take part in the study. The study was approved by a University of Bristol ethics committee.

Data were collected via a parental survey in which parents were asked to report the gender and age of their 6-year-old to 8-year-old child, relationship to the child (mother or father), age and number of children. Parents were also asked to report their education level in four groups: up to GCSE (school examination taken at age 16), A'Level or equivalent (school examinations at age 18), degree or postgraduate training. Parents reported the number of hours per weekday that they and, separately, their 6-year-old to 8-year-old child spent watching TV, using a games console and using a smart-phone. (If parents had more than one 6-year-old to 8-year-old child, they were asked to complete the survey with reference to their oldest child in that age group.) The assessment of TV viewing via a single question has been shown to correlate ( $r=0.60$ ) with 10 days of TV diaries among young children,<sup>19</sup> and although these measures cannot provide an objective assessment of SV, this approach has been identified as the self-report approach which produces data with the highest validity.<sup>20</sup> Parents were also asked to indicate the number of hours spent multiscreen viewing. The multiscreen viewing question was based on our recent qualitative work which suggests that many children use multiple pieces of media equipment at the same time and was phrased as: "Adults and children sometimes use more than one screen device at the same time (such as a TV and laptop). We call this 'multi screen-viewing'. How much time do you spend doing this while not at work or for work/study reasons on a normal weekday." The response options for each question were: none; less than 1 h/day; up to 2 h/day; up to 3 h/day, up to 4 h/day, more than 4 h/day. As children are likely to engage in multiscreen viewing, the summing time spent in individual screen activities may lead to an overestimation of total screen-time. Moreover, the use of the four different outcomes facilitates the assessment of whether associations are different for the different types of SV; information that would aid the design of targeted behaviour change interventions. Thus, separate outcomes were created for each different type of SV. To create a variable that is consistent with the AAP guideline, the TV variable was collapsed into two groups of  $\leq 2$  h/day (none; less than 1 h/day; up to 2 h/day) and  $>2$  h/day. Owing to the frequency of responses, computer and multiscreen viewing time were coded into  $<1$  h/day (none and  $<1$  h/day) and  $\geq 1$  h/day. Games console and smart-phone time were coded as none versus some (ie, less than 1 h/day or greater).

Parental attitudes towards SV were assessed by asking parents to rate agreement with four statements: (1) SV is valuable family time; (2) SV is a good way to keep my child entertained; (3) SV is important relaxation time and (4) SV is a good way to educate my child. The response options for each question were strongly disagree, disagree, neutral, agree and strongly agree, which were coded as 1–5. The electronic media environment

was assessed by asking parents to indicate which of the following pieces of equipment they had in the home: TV; DVD player; desktop computer; laptop; games console; portable music player; handheld games console and a smart-phone. Parents were also asked to indicate which of the same eight items the child had access to in his or her bedroom. Counts of all pieces of media equipment in the house (0–8) and the child’s bedroom (0–8) were performed.

**Analysis**

Descriptive statistics were calculated for all variables. As preliminary analyses indicated that there was no evidence ( $p < 0.05$ ) of gender differences in any of the child SV variables, all analyses were run with the overall sample (ie, boys and girls combined). Five logistic regression models were run with child SV (TV viewing or computer time or games console time or smart-phone use or multiscreen viewing) as the outcome and parental SV, number of pieces of media equipment in the home and bedroom and parental attitudes towards SV as exposures. All models were adjusted for parental education, parental age and number of children with mutual adjustment for all exposure variables.

**RESULTS**

Data were collected from 750 parents who provided information on their own behaviour and their 6-year-old to 7-year-old child. The sample included parents of 305 (41%) 6-year-old children and 345, 7-year-old children. Descriptive statistics for the 750 parents are shown in table 1. The majority of the parents ( $n=735/98\%$ ) were mothers. A quarter (26.1%) of the parents reported being educated up to GCSE level, 213 (28.4%) A’Levels or equivalent, 212 (28.3%) Degree level and 129 (17.2%) reported having some postgraduate training. The mean age was 35.5 years, and on average the parents had 2.2 children.

**Table 1** Descriptive statistics for parental characteristics

	N	Per cent
Parental gender		
Male	8	1.07
Female	735	98.00
Missing	7	0.93
Parental education		
Up to GCSE	196	26.13
A’Level or equivalent	213	28.40
Degree	212	28.27
Postgraduate degree	129	17.20
	<b>Mean</b>	<b>SD</b>
Parental age (years) (n=733)	35.52	5.93
Number of children (n=750)	2.23	0.91

Over 75% of the parents and 62% of the children spent more than 2 h/weekday watching TV. Over two-thirds of the parents and almost 40% of the children spent more than an hour per day multiscreen viewing. A relatively small proportion of parents (18%) reported spending time on a games console, but over 40% of children and parents reported spending some time using a smart-phone on a weekday. The mean number of pieces of media equipment in the home was 5.9 items, with an average of 1.3 items in the child’s bedroom (table 2).

**Table 2** Descriptive statistics (n, %, mean and SD) for outcome and exposure variables

Variable	N	Per cent
Parental TV viewing per weekday		
<2 h	182	24.3
≥2 h	568	75.7
Child TV viewing per weekday		
<2 h	286	38.1
≥2 h	464	61.9
Parent multiscreen viewing per weekday		
<1 h	236	31.5
≥1 h	514	68.5
Child multiscreen viewing per weekday		
<1 h	454	60.5
≥1 h	296	39.5
Parent computer time per weekday		
<1 h	306	40.8
≥1 h	444	59.2
Child computer time per weekday		
<1 h	663	88.4
≥1 h	87	11.6
Parental games console time per weekday		
None	617	82.3
Some	133	17.7
Child games console time per weekday		
None	393	52.4
Some	357	47.6
Parental smart-phone time per weekday		
None	420	56.0
Some	330	44.0
Child smart-phone time per weekday		
None	380	50.7
Some	370	49.3
	<b>Mean</b>	<b>N</b>
SV is valuable family time (disagree—agree, 1–5 scale)	2.8	0.9
SV keeps child entertained (disagree—agree, 1–5 scale)	3.2	1.0
SV helps child relax (disagree—agree, 1–5 scale)	3.3	1.0
SV helps to educate children (disagree—agree, 1–5 scale)	3.1	0.9
Number of pieces of media equipment in home (0–8)	5.9	1.4
Number of pieces of media equipment in child’s bedroom (0–8)	1.3	1.4

SV, screen-viewing.

**Table 3** Logistic regression model of Child TV viewing (>2 h/day) predicted by parental TV viewing, parental attitudes and media equipment (n=733)\*

	OR	95% CI	p Value
Parental TV viewing >2 h/day (ref <2 h)	7.75	2.57 to 5.47	<b>&lt;0.001</b>
Number of SV items in house	0.96	0.86 to 1.09	0.551
Number of SV items in child's bedroom	1.22	1.07 to 1.39	<b>0.004</b>
SV is valuable family time	1.16	0.96 to 1.41	0.134
SV keeps children entertained	1.06	0.87 to 1.29	0.561
SV is relaxing for children	1.49	1.20 to 1.84	<b>&lt;0.001</b>
SV helps to educate children	0.96	0.77 to 1.20	0.743

\*Models are all mutually adjusted for the variables listed above as well as parental education, parental age and number of children SV, screen-viewing. p Values <0.05 are in bold.

Logistic regression analysis indicated that children who had parents who spent more than 2 h/day watching TV were over 7.8 times more likely to exceed the 2 h TV threshold. Each additional item of media equipment in the child's bedroom was associated with a 22% increase in likelihood of watching >2 h of TV, and each increment in the parental agreement that watching TV was relaxing for their child was associated with a 49% increase (table 3).

Children who had parents who spent more than an hour per day using a computer for non-work activity were over two times more likely to spend more than an hour using a computer. Each piece of media equipment in the child's bedroom was associated with a 14% increase in the likelihood that the children spent an hour or more using a computer (table 4).

Children who had a parent who spent an hour or more multiscreen viewing were 34 times more likely to also spend more than an hour per day multiscreen viewing. Equally, each additional item of SV equipment in the bedroom was associated with an over 35% increase in the likelihood that girls and boys spent an hour or more per day multiscreen viewing (table 5).

If a parent reported spending some time using a games console, children were over six times more likely to spend time on a games console. Each additional piece of media equipment in the home was associated with a 40% increase in the likelihood that the child used a games console with each piece of media equipment in the child's bedroom associated with a 32% increase in the odds (see online supplementary table A). The number of pieces of media equipment in the home (OR=1.43) and equipment in the child's bedroom (OR=1.34) were also associated with an increased likelihood that the child used a smart-phone (see online supplementary table B).

**Table 4** Logistic regression model of child weekday computer time (<1 h vs ≥1 h) predicted by parental computer time, parental attitudes and media equipment (n=733)\*

	OR	95% CI	p Value
Parental TV computer time ≥1 hour (ref <1 h)	2.15	1.54 to 3.00	<b>&lt;0.001</b>
Number of SV items in house	1.16	1.03 to 1.31	0.013
Number of SV items in child's bedroom	1.14	1.00 to 1.31	<b>0.049</b>
SV is valuable family time	1.15	0.95 to 1.39	0.159
SV keeps children entertained	0.91	0.75 to 1.12	0.376
SV is relaxing for children	1.05	0.85 to 1.29	0.651
SV helps to educate children	1.05	0.84 to 1.31	0.644

\*Models are all mutually adjusted for the variables listed above as well as parental education, parental age and number of children SV, screen-viewing. p Values <0.05 are in bold.

## DISCUSSION

The data presented in this paper show strong associations between parent and child SV. Where parents engage in higher levels of SV, children are more likely to also do so. These findings are consistent with previous studies that have examined associations between children and parent TV viewing<sup>7 8</sup> but extend the literature by showing that patterns of association are consistent across different types of SV. The data also suggest that associations between maternal and child SV appear to

**Table 5** Logistic regression model of child multiscreen viewing time (<1 h vs ≥1 h) predicted by parental multiscreen viewing time, parental attitudes and media equipment (n=733)\*

	OR	95% CI	p Value
Parental multi-screen viewing ≥1 h (ref <1 h)	33.99	16.57 to 69.71	<b>&lt;0.001</b>
Number of SV items in house	0.97	0.84 to 1.10	0.616
Number of SV items in child's bedroom	1.35	1.17 to 1.56	<b>&lt;0.001</b>
SV is valuable family time	1.18	0.95 to 1.46	0.129
SV keeps children entertained	1.06	0.84 to 1.35	0.609
SV is relaxing for children	1.09	0.86 to 1.39	0.471
SV helps to educate children	0.93	0.72 to 1.18	0.533

\*Models are all mutually adjusted for the variables listed above as well as parental education, parental age and number of children SV, screen-viewing. p Values <0.05 are in bold.

be stronger for girls than for boys, perhaps indicating that maternal modelling of SV has a stronger influence on girls than boys. However, as the overwhelming majority of our sample was mothers, we are not able to determine if paternal modelling could be important for boys and, as such, this is an important topic that warrants further examination.

These are the first data to quantitatively report on levels of multiscreen viewing in children and their parents. In previous qualitative research,<sup>7</sup> we have highlighted the existence of this important new behaviour, but the data presented here clearly show associations between parent and child multiscreen viewing behaviour. As multiscreen viewing will only increase in prominence as technology changes, coupled with our identification of parent-child associations, family-based approaches to SV reduction is likely to be needed. These strategies might include parenting programmes or educational sessions and work that examines the utility of these approaches.

Access to media equipment, particularly media equipment in the child's bedroom, was associated with an increased likelihood that the children watched more TV, played on a games console, used a smart-phone and engaged in multiscreen viewing. Interestingly, a recent systematic review<sup>18</sup> reported that the link between the presence of a TV in the bedroom and time spent TV viewing was equivocal among children under the age of seven, and as such, the findings from this paper lend support to the argument for removing media equipment from children's bedrooms. Perhaps, more importantly, however, the data indicate that the presence of media equipment, and media equipment in the child's bedroom in particular, is associated with an increased risk of elevated games console, smart-phone and multiscreen viewing time. As such, the data suggest that limiting access to media equipment, and limiting access in the child's bedroom in particular, is likely to be an effective method of limiting children's overall SV. It is, however, important to highlight that previous qualitative work has shown that many children and parents are resistant to removing TVs from a child's bedroom and that making this change might be difficult to achieve.<sup>16</sup> As such, parental education efforts to discourage the introduction of TVs and media equipment into the bedroom might be a more effective and less contentious approach.<sup>16</sup>

In this study, there was little evidence to suggest that parents' attitudes in relation to SV as good family time, a source of entertainment or valuable family time were associated with high child SV. It is also important to note that the means for these four questions were all close to neutral, suggesting that the items did not elicit strong responses from parents. These four questions were designed to examine the salience of four ideas that had been proposed<sup>7 13 16 17</sup> as potential reasons why parents might facilitate child SV. While these concepts and their measurement need further development, our findings suggest that developing strategies to change these parental attitudes are unlikely to yield much of an impact on children's SV. This finding is consistent with the well-established literature

which has shown that changing attitudes and knowledge have limited effect on changing nutrition-related behaviours.<sup>21 22</sup> Alternative intervention strategies such as helping parents to limit access to media equipment and family-based reduction strategies may be more fruitful.

It is important to highlight that the data presented in this study indicate only a cross-sectional association between child and parent SV. It is not possible to clearly delineate the nature and direction of the association. For example, the associations between parent and child computer time could be explained by children not seeking out parental time and attention, leaving them free to engage in SV.

### Strengths and limitations

The major strengths of this study are the provision of information on the SV behaviours of young children and their parents in a relatively large sample of UK children. The information on multiscreen viewing is also a major contribution to the literature and provides essential insights into the prevalence of this behaviour in UK families. It is, however, important to recognise that this study has a number of limitations. First, as the data were collected from an anonymous survey in which participants were recruited via a parenting website, it is possible that the sample is skewed towards participants who have a heightened interest in parenting related issues. As such, parents who might not use online services are likely to be missing from this study. Equally, as a sampling framework was not used, it is possible that the sample was skewed towards participants who had more time available to use the website, and we are therefore unable to draw any conclusions about the representativeness of the sample. The distribution of the smart-phone and games console variables led to the creation of never versus some dichotomous variables. As such, the logistic regression models for these two behaviours provide information about whether children and parents engage in these activities and not whether there is an association between high levels of these behaviours. It is also important to recognise that this study included only parental reports of parent and child SV, and as such, the results might be confounded by the extent to which parents will admit SV for both themselves and their child. Moreover, although we used adaptations of an existing scale, we do not have any reliability or validity information on these measures in this sample. A further limitation is that parents were not asked to differentiate between their or their child's educational and non-educational SV. Future research could develop self-report measures of SV which allow for outcome variables to be aligned with the recommendations. Finally, it is important to recognise that we have only been able to assess weekday patterns of SV in this study, and previous research with Portuguese children suggests that SV patterns may be different for weekday and weekend days,<sup>8</sup> and as such, it is not possible to extrapolate to the weekend.

## CONCLUSION

Over 75% of the parents and 62% of the children spent more than 2 h/weekday watching TV with over two-thirds of the parents and almost 40% of the children spending more than an hour per day multiscreen viewing. Children who have parents who engage in high levels of SV are much more likely to engage in high levels of SV with associations evident across different types of SV. Access to media equipment, particularly in the child's bedroom, was associated with higher levels of SV among boys and girls. Family-based strategies to reduce SV and limit media equipment access may be effective ways of reducing child SV.

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**Contributors** The study was conceived by RJ, SJS, PJJ, KMT, SS-B and KRF who secured the funding. Survey was designed by GFB and JKG who collected the data. Analyses were performed by RJ and SJS. RJ compiled the first draft of the paper with all authors providing critical edits and contributions to the paper. All authors approve submission. RJ is the guarantor.

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**Supplemental Table A: Logistic regression model of Child games console time (some vs. none) predicted by parental games console time, parental attitudes and media equipment (n=733)\***

	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Parental games console time (some – ref = none)	6.30	3.83 to 10.37	< <b>0.001</b>
# SV items in house	1.40	1.23 to 1.58	< <b>0.001</b>
# SV items in child bedroom	1.32	1.16 to 1.50	< <b>0.001</b>
SV is valuable family time	1.05	0.86 to 1.27	0.633
SV keeps children entertained	1.22	0.99 to 1.48	0.059
SV is relaxing for children	0.91	0.74 to 1.13	0.374
SV helps to educate children	1.03	0.83 to 1.29	0.772

\* **Models are all mutually adjusted for the variables listed above as well as parental education, parental age and number of children**

**SV = Screen-viewing**

**Supplemental Table B: Logistic regression model of Child smart-phone time (some vs. none) predicted by parental smart-phone time, parental attitudes and media equipment (n = 733)\***

	<b>OR</b>	<b>95% CI</b>	<b>P</b>
Parental smart-phone time (some – ref = none)	1.20	0.85 to 1.69	0.302
# SV items in house	1.43	1.26 to 1.62	<b>&lt;0.001</b>
# SV items in child bedroom	1.34	1.18 to 1.52	<b>&lt;0.001</b>
SV is valuable family time	1.04	0.86 to 1.25	0.668
SV keeps children entertained	1.06	0.87 to 1.29	0.546
SV is relaxing for children	0.97	0.79 to 1.19	0.749
SV helps to educate children	1.06	0.85 to 1.31	0.620

**\*\* Models are all mutually adjusted for the variables listed above as well as parental education, parental age and number of children**

**SV = Screen-viewing**