

1 **Does early childhood electronic media use predict poorer wellbeing?**

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38

39 **Abstract**

40 **Importance:** Identifying associations between early childhood behaviors such as electronic
41 media use and later wellbeing is essential to supporting positive long term outcomes.

42 **Objective:** To investigate possible dose-response associations of young children's electronic
43 media use with their later wellbeing.

44 **Design:** IDEFICS is a prospective cohort study with an intervention component. Data were
45 collected in 2007/2008 and 2009/2010.

46 **Setting:** Eight European countries taking part in the IDEFICS study.

47 **Participants:** This investigation is based on 3,604 children aged between two and six years
48 who participated in the longitudinal component of the IDEFICS study only and not in the
49 intervention.

50 **Main Outcome Measures:** In total, six indicators of wellbeing from two validated
51 instruments were used as outcomes at follow-up: peer problems and emotional problems from
52 the Strengths and Difficulties Questionnaire; emotional wellbeing, self-esteem, family
53 functioning and social networks from the KINDL. Each scale was dichotomized to identify
54 those children at risk of poorer outcomes. Indicators of electronic media use (week and
55 weekend day television and e-game/computer use) from baseline were used as predictors.

56 **Results:** Associations varied between boys and girls; however all were in the expected
57 direction. Television viewing, either week or weekend day, was more consistently associated
58 with outcomes than e-game/computer use. Across associations, children were at between 1.2
59 and 2.0 times increased risk of adverse outcomes for emotional problems and poorer family
60 functioning for each additional hour of television viewing or e-game/computer use,
61 depending on the outcome.

62 **Conclusions and Relevance:** Early childhood electronic media use is associated with some
63 indicators of wellbeing. Further research is required to identify potential mechanisms.

64 **Introduction**

65 The adverse health outcomes of sedentary behavior are increasingly being acknowledged in
66 children and adolescents.¹⁻³ A small but growing body of evidence suggests that sedentary
67 behaviors may be detrimental even at a very young age.⁴ Sedentary behaviors are those
68 behaviors which require a very low energy expenditure and are undertaken in a sitting or
69 reclining position.⁵ Electronic media use, incorporating television viewing, computer use and
70 electronic games, is one type of sedentary behavior. Evidence suggests that electronic media
71 use (mainly in the form of television viewing, the most widely studied screen behavior) may
72 be particularly detrimental to health outcomes, both during childhood and into adulthood.^{1,6}

73

74 Psychosocial health, also known as psychological and social wellbeing (hereafter referred to
75 as wellbeing), as one potential outcome of young children's behaviors, is not well
76 investigated. A clear definition of wellbeing in the health behavior literature is yet to be
77 arrived at,⁷ reflecting the multi-dimensional nature of this concept. Nonetheless, wellbeing
78 can reasonably be conceptualized as comprising both positive and adverse psychological and
79 social attributes and behaviors, such as emotional symptoms, prosocial behavior, self-control
80 and externalizing problems. Poorer levels of wellbeing during early childhood have been
81 shown to be associated with later outcomes such as depression, hostile behavior and
82 aggressive interpersonal behavior.⁸⁻¹⁰ Conversely, good levels of wellbeing during early
83 childhood may support positive behavioral, social and academic outcomes during later
84 childhood.^{11,12} Some evidence suggests that higher levels of electronic media use may be
85 detrimental to wellbeing during early childhood.⁴ However, the evidence supporting these
86 associations is extremely limited and largely inconclusive. There is a particular dearth of
87 information on dose-response associations of electronic media use with wellbeing⁴ which is
88 necessary to inform targets for interventions, public health programs and policy including

89 behavioral guidelines. Longitudinal studies are needed to identify such associations from the
90 early childhood period to later childhood. Supporting the development of healthy wellbeing
91 during early childhood is critical for later mental health and development and reducing
92 electronic media use may potentially be an effective mechanism by which to do so. The aim
93 of this study was to investigate possible dose-response associations of young children's
94 electronic media use with their wellbeing two years later.

95

96 **Methods**

97 *Participants*

98 This study utilized data from the European IDEFICS (Identification and prevention of
99 dietary- and lifestyle-induced health effects in children and infants) study. IDEFICS is a
100 European cohort study that investigated the etiology of diet and lifestyle related diseases and
101 disorders in children, as well as developing and evaluating a primary prevention program
102 focusing on childhood obesity. Design, sampling and baseline participant characteristics have
103 previously been described.¹³ A population-based sample of 16,225 children aged 2-9 years
104 was recruited across eight different European countries (Belgium, Cyprus, Estonia, Germany,
105 Hungary, Italy, Spain and Sweden). In total, the families of 31,543 children aged 2-9 years
106 were contacted and 16,864 consented to participate in the baseline survey (53% of invited).
107 Subsequently, the families of 16,225 children (96% of those consenting) provided sufficient
108 data (parental questionnaire, measured child height and weight) to be included in the
109 IDEFICS database. This study utilized data from participants aged between two and six years
110 at baseline who did not participate in the intervention (n=3,604).

111

112 *Measures and data management*

113 Data were collected simultaneously in all study centers at baseline (September 2007 to June
114 2008) and 24 months later at follow-up (September 2009 to May 2010). Procedures were
115 available in a central survey manual and quality control checks were carried out across all
116 study centers to ensure standardized data collection across countries.¹⁴ A parental
117 questionnaire, tested for its comprehensibility, length, structure and acceptability by
118 parents,¹⁴ was used to assess socio-demographic data and obtain parental reports of children's
119 electronic media use. Parents were requested to complete the questionnaire during the
120 examinations or at home.

121

122 *Predictor variables*

123 Four electronic media use variables from the baseline survey were included in this study as
124 predictors. Parents reported their child's television viewing, and e-game/computer use, for
125 week and weekend days separately. Response options were: 0=Not at all; 1=Less than 30 min
126 per day; 2=Less than 1 hour per day; 3=Approx. 1-2 hours per day; 4=Approx. 2-3 hours per
127 day; and 5=More than 3 hours per day. The questions were adapted from the Generation M-
128 study, a nationally representative survey to assess children's media use in the U.S.¹⁵ Test-
129 retest reliability in the IDEFICS study (n=421) was good for TV viewing (weekdays: ICC=
130 0.71; weekend days: ICC=0.66) and e-game/computer use on weekend days (ICC=0.74).
131 Reliability bordered the generally accepted level of 0.5^{16,17} for e-game/computer use on
132 weekdays (ICC=0.49).

133

134 Electronic media use variables were transformed into an approximation of minutes per hour
135 engaging in the behavior. Specifically, response categories one and two, which combined
136 represented less than one hour per day, were transformed to 0.5 hours; response category
137 three, representing 1-2 hours per day, was transformed to 1.5 hours; response category four

138 (2-3 hours per day) was transformed to 2.5 hours per day, and response category five (more
139 than 3 hours per day) was transformed to 3.5 hours per day. This transformation was applied
140 similarly for each of the four baseline electronic media use variables (weekday and weekend
141 TV; weekday and weekend e-games/computer¹⁸).

142

143 *Outcome variables*

144 The IDEFICS parental questionnaire included a number of items assessing aspects of
145 children's wellbeing which were used to generate the outcomes at follow-up. Questions were
146 drawn from the Strengths and Difficulties Questionnaire (SDQ).^{19,20} All items for the
147 emotional problems and peer problems sub-scales were included and have been used in this
148 study. Additionally, four sub-scales – self-esteem, emotional wellbeing, family functioning
149 and social networks – from the KINDL, an instrument for assessing health-related quality of
150 life in children and adolescents,²¹ were included in the parental questionnaire and utilized in
151 this study.

152

153 Items in the peer and emotional problems scales of the SDQ were scored in accordance with
154 published scoring instructions such that a higher score represents a less favorable outcome.²⁰
155 Children's responses can be categorized as 'normal', 'borderline' or 'abnormal' for each of
156 the scales. For the purposes of analyses, each scale was dichotomized into either healthy
157 score (normal category) or at-risk score (borderline and abnormal categories).

158

159 Items in each of the four included KINDL scales were scored as per the syntax provided on
160 the KINDL website.²² Total scaled scores /100 were subsequently created with higher scores
161 representing more favorable indicators of wellbeing. In the absence of norms for children
162 younger than seven years of age, the 25th percentile of each scale was chosen to distinguish

163 those children at risk of poorer wellbeing. That is, children whose scores fell at or below the
164 25th percentile had poorer scores on each of the scales than children whose scores fell above
165 that point. The 25th percentile was subsequently used to dichotomize children's scores: those
166 at or below the 25th percentile vs. those above it.

167

168

169 *Covariates*

170 Parents reported their child's date of birth in the baseline survey, from which child age was
171 calculated. Socio-economic position (SEP) of families was assessed through parent-reported
172 education²³ (highest education of both parents, classified according to the International
173 Standard Classification of Education), income, unemployment, dependence on social welfare
174 and migration background of parents.¹³ Child weight was measured using an electronic scale
175 (Tanita BC 420 SMA, Tanita Europe GmbH, Sindelfingen, Germany) to the nearest 0.1 kg,
176 with all clothing except underwear and T-shirts removed. Height was measured using a
177 telescopic stadiometer (Seca 225, Birmingham, UK) to the nearest 0.1 cm. Body mass index
178 (BMI) was calculated as weight (kg) divided by height squared (meter). Baseline measures of
179 each of the six wellbeing indicators were managed in the same manner described for those at
180 follow-up.

181

182 *Analyses*

183 Descriptive analyses and statistics (mean, standard deviation (SD), 95%-confidence interval,
184 *t*-test, χ^2) assessed differences in predictor variables at baseline and outcome variables at
185 follow-up between boys and girls. Continuous and dichotomized scales of outcome variables
186 were used for this purpose. Descriptive analyses were undertaken in Stata 8.0 (Stata Corp,
187 College Station, Texas, USA). Associations between each of the baseline electronic media

188 use variables and each of the follow-up wellbeing variables were assessed in SPSS 20.0 using
189 generalized linear mixed models. Analyses investigated whether or not increased electronic
190 media use at baseline predicted increased odds of children being categorized in the at-risk
191 category of each of the six wellbeing sub-scales. All models controlled for center of
192 recruitment as a random effect. As stated, only those children from the control region(s) in
193 each country were included in this study..The fact that Italy recruited their children from
194 more than one control region was accounted for in the analysis by including Italian regions as
195 covariate dummies in all models. Additionally, child baseline BMI and age, and family socio-
196 economic status were included as covariates (Model A). A second set of models were
197 analyzed for each outcome variable. These models (Model B) included all variables from
198 Model A and additionally included the baseline equivalent of the follow-up wellbeing scale
199 (i.e. baseline peer problems when follow-up peer problems was the outcome). All analyses
200 were undertaken separately for boys and girls.

201

202 **Results**

203 Mean age of children in this sample at baseline was 4.3 (SD 0.9) years and 6.3 (SD 1.0) years
204 at follow-up. Slightly more than half of the included sample (52.4%) was male. According to
205 the Cole criteria,²⁴ the majority of children (73.5%) were a healthy weight; 13.2% were
206 underweight and 13.4% were overweight or obese. Almost half the sample (39.7%) was from
207 high SEP families; 8.9% were from low SEP families, with 32.4% and 16.1% from medium-
208 low and medium-high SEP families, respectively. Descriptive characteristics of the included
209 children by country and sex are presented in Table 1.

210

211 INSERT TABLE 1 HERE

212

213 *Differences between boys and girls in predictor and outcome variables*

214 Table 2 reports boys' and girls' mean time spent on each of the electronic media behaviors at
215 baseline. Boys spent significantly more time in all electronic media behaviors than girls. In
216 some cases, differences were minimal and may not have meaningful implications. Table 3
217 reports the mean scores for boys and girls for each of the six wellbeing scales in this study as
218 well as the percentage of boys and girls who were classified as at-risk on each of the six
219 scales. Parents of boys reported slightly increased mean scores for peer problems than
220 parents of girls. There were no between-sex differences for the mean scores of other
221 indicators of wellbeing or for the percent of boys and girls classified as at-risk for any of the
222 scales.

223

224 INSERT TABLES 2 & 3 HERE

225

226 *Associations between baseline electronic media use and follow-up wellbeing*

227 Table 4 reports the odds ratios for associations between each of the baseline measures of
228 electronic media use and boys and girls being classified as at-risk on each of the SDQ and
229 KINDL sub-scale indicators of wellbeing two years later. Some associations identified in
230 Model A for each of the outcomes were attenuated when the relevant baseline wellbeing
231 indicator was included and only associations from Model B analyses are discussed here. Few
232 associations were evident. Every additional hour of weekday e-game/computer use was
233 associated with a twofold increase in the likelihood of girls being at-risk of emotional
234 problems. Every additional hour of weekday TV viewing was associated with a 1.3 and 1.2
235 times increased likelihood of girls and boys, respectively, being at risk of poor family
236 functioning. Similarly, every hour of weekend TV viewing was associated with a 1.3 times
237 increased likelihood of girls being at risk of poor family functioning. There were no

238 associations for either girls or boys on peer problems, self-esteem, emotional wellbeing or
239 social network scales of wellbeing.

240

241 INSERT TABLE 4 HERE

242

243 **Discussion**

244 This study has investigated possible dose-response associations between electronic media use
245 during early childhood and increased risk of poorer wellbeing two years later. Where
246 associations were identified, they were in the expected directions, such that increased
247 participation in TV/e-game/computer use was associated with a greater likelihood of being in
248 the at-risk category for poorer wellbeing.

249

250 Differences in associations between models controlling and not controlling for baseline
251 wellbeing enable causal pathways to be identified. These findings suggest that children with
252 higher levels of TV viewing at baseline are at increased risk of poor family functioning, and
253 that girls with higher levels of e-game/computer use are at increased risk of emotional
254 problems. The consistency of associations between TV viewing and being at-risk of poor
255 family functioning in the fully adjusted models suggests that families who view more TV
256 during their child's early years do not support children's wellbeing as well as other families.
257 This may be because of a lack of, or failure to develop, appropriate relationships within the
258 family.

259

260 Investigation of associations between electronic media use and indicators of wellbeing during
261 early childhood is an emerging area. Those studies which do investigate such associations
262 have used a range of instruments to capture wellbeing with mixed findings. Previous studies

263 have reported dose response associations in the expected direction of electronic media use
264 with aggression,²⁵ attention problems,^{26,27} externalizing behavior,²⁸ poor classroom
265 engagement²⁹ and emotional problems.³⁰ Findings from the current study therefore reinforce
266 the adverse influence of electronic media use on children's wellbeing. However, previous
267 studies have focused solely on television viewing⁴ and have neglected to investigate
268 associations with other forms of electronic media use as this study has done. This study is
269 therefore unique in its investigation of associations between e-game/computer use and risk of
270 poorer wellbeing.

271

272 This study found null associations with several of the indicators of poor wellbeing. Previous
273 studies have also reported null associations.^{27,30-33} It is possible that wellbeing indicators in
274 young children may be more homogenous than those in their older counterparts, therefore
275 precluding some possibility of identifying contributory factors. Alternatively, greater
276 sensitivity in existing wellbeing instruments may be required to detect subtle, but potentially
277 meaningful, differences in wellbeing in children. With respect to electronic media use, it may
278 not be only the viewing time which is detrimental. Previous studies have found that other
279 electronic media use characteristics, such as violent content³⁴ or background television,²⁵ are
280 associated with children's wellbeing outcomes. Future research may wish to simultaneously
281 investigate associations between viewing time, content, constancy (background TV) and
282 other characteristics of the family electronic media environment, including parental electronic
283 media use practices such as co-viewing or rules.^{35,36}

284

285 Differences in findings between boys and girls have rarely been investigated and a recent
286 review noted this as a limitation to the current literature.⁴ However, where this has been
287 undertaken some differences are noticeable,^{30,34} as in this study. Such differences may be due

288 to socialization processes within the family which have previously been shown to be evident
289 even in young children's behaviors.³⁷ However, further exploration is necessary to unpack
290 potential mechanisms of these differences.

291

292 There may be several possible mechanisms which may explain the identified associations, but
293 little research has investigated these mechanisms. That which does exist focuses primarily on
294 the adult population and outcomes such as depression. One potential mechanism which may
295 be appropriate to the early childhood population investigation could be associated with
296 minimization of social interaction. For instance, the social withdrawal hypothesis suggests
297 that with increased TV viewing individuals participate in less social interaction which may
298 subsequently be detrimental to positive wellbeing.³⁸ However, such research has not been
299 undertaken in the early childhood population and therefore the potential of social interaction,
300 or other factors, being an explanatory mechanism is unclear. Further, where young children
301 are concerned, parents or siblings may participate in TV viewing and other electronic media
302 use with the child.^{35,36} If this occurs, and discussion and interaction around the content
303 ensues, the social withdrawal hypothesis may not be applicable. Such interaction may explain
304 the lack of association of electronic media use with peer problems and social networks, while
305 the social withdrawal hypothesis may explain identified associations with other outcomes in
306 this study. Further studies in this area are warranted. Investigation of factors such as parental
307 co-viewing as potential mediating factors is also necessary.

308

309 Strengths and limitations of the current study must be acknowledged. The study included a
310 large socio-economically diverse sample which allowed for investigation of associations
311 separately for boys and girls. The study included only parental reports of both predictor and
312 outcome variables and therefore some bias may exist. Utilizing an objective measure of

313 electronic media use may lead to different findings as may inclusion of teacher- or child-
314 report of wellbeing. Nonetheless, this study included follow-up measures of wellbeing,
315 allowing for investigation of associations across time.

316

317 Future research may wish to test published findings from cohort studies such as this in
318 interventions which target reduction in screen behaviors and monitor potential changes in a
319 range of wellbeing indicators. Ideally such programs would be delivered to large, diverse
320 samples to identify potential differences in influences on wellbeing through behaviors when
321 the same strategies and opportunities are provided to children. Ideally, changes in behaviors
322 and outcomes (such as wellbeing) would be monitored over longer rather than shorter periods
323 of time.

324

325 **Conflict of Interests**

326 The authors declare that they have no conflict of interests.

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440 Table 1: Descriptive characteristics of the included sample

Country	Age (years)				Socioeconomic position				BMI category		
	2	3	4	5	Low	Medium-low	Medium-high	High	Underweight	Healthy weight	Overweight/obese
Belgium											
Boys	12 (4.6)	82 (31.1)	83 (31.4)	87 (33.0)	1 (0.4)	62 (23.9)	52 (20.0)	145 (55.8)	50 (18.9)	202 (76.5)	12 (4.6)
Girls	21 (8.5)	74 (30.1)	60 (24.4)	91 (37.0)	4 (1.6)	88 (35.8)	33 (13.4)	121 (49.2)	40 (16.3)	190 (77.2)	16 (6.5)
Cyprus											
Boys	6 (2.6)	34 (14.8)	87 (37.8)	103 (44.8)	7 (3.7)	36 (18.8)	48 (25.0)	101 (52.6)	28 (12.2)	176 (76.5)	26 (11.3)
Girls	3 (1.5)	31 (15.1)	66 (32.2)	105 (51.2)	9 (4.81)	34 (18.2)	43 (23.0)	101 (54.0)	27 (13.2)	134 (65.4)	44 (21.5)
Estonia											
Boys	52 (22.4)	95 (41.0)	76 (32.8)	9 (3.9)	3 (1.3)	84 (36.5)	108 (47.0)	35 (15.2)	30 (12.9)	189 (81.5)	13 (5.6)
Girls	41 (21.7)	81 (42.9)	61 (32.3)	6 (3.2)	6 (3.2)	71 (37.8)	85 (45.2)	26 (13.8)	21 (11.1)	150 (79.3)	18 (9.5)
Germany											
Boys	15 (6.6)	64 (28.3)	95 (42.0)	52 (23.0)	85 (39.2)	58 (26.7)	37 (17.1)	37 (17.1)	35 (15.5)	167 (73.9)	24 (10.6)
Girls	4 (1.9)	70 (33.8)	87 (42.0)	46 (22.2)	76 (37.8)	58 (28.9)	39 (19.4)	28 (13.9)	21 (10.1)	145 (70.1)	41 (19.8)
Hungary											
Boys	3 (1.2)	73 (28.0)	88 (33.7)	97 (37.2)	3 (1.2)	105 (40.4)	32 (12.3)	120 (46.2)	63 (24.1)	178 (68.2)	20 (7.7)
Girls	11 (3.8)	74 (25.6)	96 (33.2)	108 (37.4)	4 (1.4)	111 (39.2)	29 (10.3)	139 (49.1)	58 (20.1)	204 (70.6)	27 (9.3)
Italy											
Boys	10 (4.3)	74 (31.6)	76 (32.5)	74 (31.6)	47 (20.4)	139 (60.2)	0 (0)	45 (19.5)	12 (5.1)	154 (65.8)	68 (29.1)
Girls	7 (3.2)	66 (30.4)	76 (35.0)	68 (31.3)	46 (21.4)	126 (58.6)	0 (0)	42 (20.0)	6 (2.8)	130 (59.9)	81 (37.3)
Spain											
Boys	10 (5.2)	53 (27.6)	77 (40.1)	52 (27.1)	10 (5.2)	60 (31.4)	21 (11.0)	100 (52.4)	12 (6.3)	155 (80.7)	25 (13.0)
Girls	10 (7.4)	36 (26.7)	63 (46.7)	26 (19.3)	9 (6.7)	43 (32.1)	13 (9.7)	69 (51.5)	15 (11.1)	92 (68.2)	28 (20.7)
Sweden											
Boys	64 (25.5)	69 (27.5)	57 (22.7)	61 (24.3)	5 (2.1)	42 (17.3)	27 (11.1)	169 (69.6)	33 (13.2)	201 (80.1)	17 (6.8)
Girls	53 (23.5)	57 (25.2)	59 (26.1)	57 (25.2)	5 (2.3)	50 (22.7)	15 (6.8)	150 (68.2)	25 (11.1)	180 (79.7)	21 (9.3)

442

443 Table 2: Mean electronic media use at baseline for boys and girls

Baseline electronic media use (hours)	Boys Mean (SD)	Girls Mean (SD)
Weekday TV	1.04 (0.75)	0.98 (0.70)
Weekend TV	1.62 (0.93)	1.53 (0.91)
Weekday e-game/computer	0.19 (0.39)	0.11 (0.26)
Weekend e-game/computer	0.33 (0.56)	0.21 (0.40)

444

445 Table 3: Mean values for, and percent at risk of poor, wellbeing outcomes at follow-up for
446 boys and girls

Follow-up wellbeing indicators	Boys		Girls	
	Mean (SD)	% at risk	Mean (SD)	% at risk
SDQ scales*				
emotional problems	1.5 (1.6)	11.9	1.5 (1.6)	12.3
peer problems	1.3 (1.3)	17.6	1.1 (1.4)	15.2
KINDL scales#				
emotional wellbeing	81.9 (11.3)	33.7	82.3 (11.2)	31.8
self esteem	63.0 (10.6)	34.4	63.8 (10.6)	31.4
family	71.5 (10.2)	30.0	71.4 (10.2)	27.0
friends	70.6 (10.2)	27.5	70.6 (9.7)	26.8

447 Note: * Higher mean SDQ scores indicate less positive outcomes (range 1-10); # higher mean
448 KINDL scores indicate more positive outcomes (range 1-100).

449

451 Table 4: Associations between baseline electronic media use behaviors and risk of poorer wellbeing at follow-up

Wellbeing outcomes (at-risk) & individual screen behaviors (hours)	Girls		Boys	
	Model A [#]	Model B	Model A	Model B
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
SDQ Peer Problems				
Weekday TV	1.2 (0.9, 1.5)	1.1 (0.9, 1.5)	1.1 (0.9, 1.3)	1.0 (0.8, 1.3)
Weekend TV	1.3 (1.1, 1.6)	1.2 (1.0, 1.5)	1.1 (0.9, 1.2)	1.0 (0.9, 1.2)
Weekday PC	1.9 (1.0, 3.6)	1.9 (1.0, 3.8)	0.9 (0.6, 1.3)	0.8 (0.5, 1.3)
Weekend PC	1.3 (0.8, 1.9)	1.2 (0.8, 1.8)	0.9 (0.7, 1.2)	0.9 (0.6, 1.2)
SDQ Emotional Problems				
Weekday TV	1.4 (1.1, 1.9)	1.3 (1.0, 1.7)	1.2 (1.0, 1.6)	1.2 (0.9, 1.5)
Weekend TV	1.3 (1.1, 1.6)	1.3 (1.0, 1.6)	1.1 (0.9, 1.4)	1.0 (0.8, 1.3)
Weekday PC	1.9 (1.0, 3.6)	2.0 (1.0, 4.0)	1.2 (0.7, 1.9)	1.3 (0.8, 2.1)
Weekend PC	1.1 (0.7, 1.8)	1.1 (0.7, 1.8)	1.0 (0.7, 1.4)	1.0 (0.7, 1.4)
KINDL Self Esteem				
Weekday TV	1.0 (0.9, 1.3)	1.0 (0.8, 1.3)	1.2 (1.0, 1.4)	1.1 (0.9, 1.3)
Weekend TV	1.0 (0.8, 1.1)	1.0 (0.8, 1.1)	1.1 (1.0, 1.3)	1.1 (0.9, 1.3)
Weekday PC	0.9 (0.5, 1.6)	1.0 (0.6, 1.9)	0.9 (0.6, 1.2)	1.0 (0.7, 1.4)
Weekend PC	0.8 (0.6, 1.2)	1.0 (0.7, 1.4)	1.0 (0.8, 1.3)	1.1 (0.8, 1.4)
KINDL Emotional Wellbeing				
Weekday TV	1.1 (0.9, 1.3)	1.1 (0.9, 1.4)	1.2 (1.0, 1.5)	1.2 (1.0, 1.4)
Weekend TV	1.1 (0.9, 1.3)	1.1 (0.9, 1.3)	1.2 (1.0, 1.3)	1.1 (1.0, 1.3)
Weekday PC	1.3 (0.8, 2.2)	1.2 (0.7, 2.0)	1.2 (0.9, 1.7)	1.1 (0.8, 1.5)
Weekend PC	1.1 (0.8, 1.5)	0.9 (0.7, 1.3)	1.1 (0.9, 1.4)	1.0 (0.8, 1.3)
KINDL Family				
Weekday TV	1.2 (1.0, 1.5)	1.3 (1.0, 1.6)	1.4 (1.1, 1.6)	1.2 (1.0, 1.5)
Weekend TV	1.3 (1.1, 1.5)	1.3 (1.0, 1.5)	1.2 (1.0, 1.3)	1.1 (0.9, 1.3)

Weekday PC	0.9 (0.5, 1.6)	0.9 (0.5, 1.7)	1.0 (0.7, 1.4)	1.0 (0.6, 1.4)
Weekend PC	1.0 (0.7, 1.5)	1.0 (0.7, 1.5)	0.8 (0.6, 1.0)	0.8 (0.6, 1.0)
KINDL Friends				
Weekday TV	1.0 (0.8, 1.2)	0.9 (0.7, 1.1)	1.2 (1.0, 1.4)	1.2 (1.0, 1.4)
Weekend TV	1.1 (1.0, 1.3)	1.1 (0.9, 1.3)	1.0 (0.9, 1.2)	1.0 (0.9, 1.2)
Weekday PC	0.8 (0.5, 1.5)	0.8 (0.5, 1.5)	0.8 (0.5, 1.1)	0.7 (0.5, 1.1)
Weekend PC	0.8 (0.4, 1.2)	0.8 (0.6, 1.2)	0.9 (0.7, 1.1)	0.9 (0.7, 1.1)

452 #Model A controls for region, age, socio-economic position, BMI and clustering by center of recruitment; Model B additionally controls for
453 baseline levels of the SDQ or KINDL outcome variable under investigation

454