The Impact of Screen Engagement on Young Children’s Cognitive Development

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What is Screen Time?

- Early research uses the term ‘screen time’ to refer largely to TV watching

- In more recent years screen time has been used interchangeably to refer to both TV watching and engaging in interactive screen technology devices such as tablets, phones, or video games

  (Strasburger et al., 2013)

- Has been an area of interest for researchers in physical development (i.e. Screen time and Obesity)

  (Peck, Scharf, Conaway, & DeBoer, 2015)
Screen Time in the Media

Campaign outlines 'practical and simple' tips for parents to limit children's screen time

Too much screen time can cause mental health problems in children, study finds

Smartphones delay babies' language, and shorten their sleep
Screen Time in Scientific Practice

Three problems with the debate around screen time

Not a ‘one size fits all’!

Screen time guidelines need to be built on evidence, not hype

Why the very idea of ‘screen time’ is muddled and misguided

Screen time harm to children is unproven, say experts

Researchers say World Health Organisation's warnings over 'gaming disorder' are premature and say other factors affect child wellbeing
Is there a difference between types?

- Research on physical development suggests so -
  In studies concerned with cardiovascular risks, blood pressure and obesity, TV was the only form of screen time to indicate a negative impact on physical health.

  (Anderson, Economos, & Must, 2008; Stamatakis et al., 2013)

- TV viewing doesn’t even have the same effect as sedentary time. Computer use, painting, sitting, and reading are not positively associated with high blood pressure.

  (Gopinath et al., 2012)
Is there a difference between types?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Traditional Toys</th>
<th>Touch-Screen Devices</th>
<th>Television</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactive</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Interactive</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Tailorable</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Progressive</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Can promote joint attention</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Highly portable</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-Dimensional</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

(Christakis, 2014)

- Scaffolding (Yelland & Masters, 2007)
- Video Deficit (Neumann, 2018)
- Computer use and school readiness (Delen, 2016)
- Cause and Effect (Lerner and Ciervo, 2003)
- Interactivity!!
Objectives of the Research:

• Assess digital devices’ impact on cognitive development during early childhood (0 to 6 years of age), in comparison to TV viewing

• Control for environmental factors and parental influences

• Conceptualise these findings in light of developmental theories
Developmental Theorists

Bronfenbrenner’s (1979) Ecological Systems
Changes at any of these levels can influence cognitive development

Vygotsky’s (1978) Zone of Proximal Development
Scaffolding and ‘Guide on the Side’

Immersive and hands-on learning
Learning Theory in the Research

• Parental Engagement - Talk time, Scaffolding, and Language Development
  
  (Pempek et al., 2011; Lavigne, Hanson, & Anderson, 2015)

• Interaction - Experiential Learning, cause and effect, STEM learning
  
  (Aladé et al., 2016)

• Educational Content - Educational content or child-directed content have better cognitive outcomes at a later age
  
  (Wright et al., 2001; Linebarger & Walker, 2005)
Screen Time RECCIPE

Recommendations for:

- Educational Content
- Child Interaction
- Parental Engagement
Methods

Participants - 9,000 Irish 5 year olds (1 in 7)

Design - Secondary research, analysis of Growing Up in Ireland dataset
2 DVs = Reasoning Ability, Vocabulary Development
2 IVs = Amount of Screen Time exposure (4 groups), and Type of Screen Time Exposure (5 groups)

Materials - Primary Caregiver Questionnaire (Screen time variables) & British Abilities Scale (Pictures Similarities task and Naming Vocabulary task)

Procedure - Discriminate variables of interest, compute Statistics, including Hierarchical Multiple Regressions
Results – Screen Type

Children who engaged in mostly educational games and TV viewing scored significantly lower than the other groups in reasoning ability.

Children who engaged in mostly computer or video games scored significantly lower than all other groups in vocabulary development.
Results – Screen Time

Children who engaged in screen time for more than two hours a day had significantly lower cognitive scores overall than those who engaged in under two hours of daily screen time.
Hierarchical Multiple Regressions

- 5 Step Model – Screen Time Variables and Home Environment Factors (Parent Education, Employment, Attachment, Siblings)

Reasoning Ability

Significant impact of:
- ‘No Screen Time’
- ‘Mix of All’
- ‘More than 3 hours’

Even after other factors are accounted for

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Sig.</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 5</strong></td>
<td></td>
<td></td>
<td>.027</td>
</tr>
<tr>
<td>(Constant – TV &amp; 1 to &lt; 2 Hours)</td>
<td>75.304</td>
<td>.000</td>
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</tr>
<tr>
<td>No Screen Time</td>
<td>1.973</td>
<td>.013*</td>
<td></td>
</tr>
<tr>
<td>Educational Games</td>
<td>-1.321</td>
<td>.190</td>
<td></td>
</tr>
<tr>
<td>Video Games</td>
<td>.876</td>
<td>.259</td>
<td></td>
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<tr>
<td>Mix of all</td>
<td>1.189</td>
<td>.000*</td>
<td></td>
</tr>
<tr>
<td>2 to &lt; 3 hours</td>
<td>-.565</td>
<td>.052</td>
<td></td>
</tr>
<tr>
<td>3 + hours</td>
<td>-1.699</td>
<td>.000*</td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
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<tr>
<td>Education Level</td>
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<tr>
<td>Level of Closeness</td>
<td>.300</td>
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<tr>
<td>Level of Conflict</td>
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<tr>
<td>Parental Stress Score</td>
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<tr>
<td>Siblings</td>
<td>.623</td>
<td>.121</td>
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</table>
Hierarchical Multiple Regressions

- 5 Step Model – Screen Time Variables and Home Environment Factors (Parent Education, Employment, Attachment, Siblings)

Vocabulary

Significant impact of:

- ‘Video games’

Even after other factors are accounted for

<table>
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<th>Sig.</th>
<th>R²</th>
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<tbody>
<tr>
<td><strong>Step 5</strong></td>
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<tr>
<td>(Constant – TV &amp; 1 to &lt; 2 hours)</td>
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<tr>
<td>No Screen Time</td>
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<tr>
<td>Educational Games</td>
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<tr>
<td><strong>Video Games</strong></td>
<td>-5.359</td>
<td>.000*</td>
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</tr>
<tr>
<td>Mix of all</td>
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<td>.616</td>
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<tr>
<td>2 to &lt; 3 hours</td>
<td>-.456</td>
<td>.303</td>
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<tr>
<td>3 + hours</td>
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<td>Employment Status</td>
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<tr>
<td>Education Level</td>
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<tr>
<td>Level of Closeness</td>
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<tr>
<td>Level of Conflict</td>
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<tr>
<td>Parental Stress Score</td>
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<td>.000</td>
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<tr>
<td>Siblings</td>
<td>-2.534</td>
<td>.000</td>
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</tbody>
</table>
Summary of Findings

- Screen time contributed to lower cognitive scores when children engage in over 3 hours per day of screen time.

- As seen from the scores on both cognitive scales, the type of use seems to impact cognitive scores, particularly game use.

- Unknown if a similar trend will appear for younger children.

- Unknown what impact more contemporary forms of screen interactions have i.e. use of smartphones and touchscreens.
Implications

• Governmental policies and regulations on screen time habits (advice for parents)

• Irish Classroom Setting - Moving from traditional to incorporating technology use
  (McCoy, Smyth, & Banks, 2012)

• Expanding research on a relatively unexplored area

• CyberSafe Ireland
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References


References


Peck, T., Scharf, R. J., Conaway, M. R., & DeBoer, M. D. (2015). Viewing as little as 1 hour of TV daily is associated with higher change in BMI between kindergarten and first grade. Obesity, 23(8), 1680-1686.


