6-2008

Does Watching Television Really Affect Cognitive Development in Young Children?

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Published: June 04, 2008 in Knowledge@SMU

Is a preschool child who spends many hours in front of the television deprived of enriching experiences and healthy activities that facilitate brain development? No doubt, early childhood experiences are critical in shaping a child's cognitive development and learning ability. Nobel Prize winner and University of Chicago economics professor James J Heckman in a 1999 working paper wrote, "Success or failure at this stage feeds into success or failure in school which, in turn, leads to success or failure in post-school learning. Early learning begets later learning and early success breeds later success, just as early failure breeds later failure."

With so much at stake, some parents are concerned about their children spending too much time watching television. But the question is how much is too much, and just how detrimental is television to a young child's cognitive development?

Joint research by economics professors Huang Fali of Singapore Management University and Lee Myoung-jae of Korea University investigated the effects of watching television on cognitive development by examining the math and reading scores of children 8-9 years of age with respect to their television-watching patterns at 6-7 years of age. Their research, detailed in a paper, "Dynamic Treatment Effect Analysis of TV Effects on Child Cognitive Development", yielded some surprises.

Research Challenges

To establish the causal relationships between watching television and cognitive development, the researchers had to overcome a few research challenges. Huang explained: "If you look at the data in a straightforward manner, you could say that because children watch more television, therefore they have lower grades. But there are several hidden problems with that. Firstly, children who watch more television may have less appropriate home and school inputs, such as fewer books at home or parents who read less to them. So, watching more television and lower grades are correlated to other factors. This is called the 'omitted variable problem'. To obtain an accurate view on the effects of television watching, it is important to capture these other factors which could lead to lower grades." To address this issue, the team used detailed data with sufficient 'environmental' control variables.

Huang expands further: "The second problem is the personal differences or predispositions in children and their parents. Each child is unique. Some children don't like to sit alone to think, so it is likely that they don't do very well in math, reading and homework. These children may also like to watch more television. So such characteristics of kids can cause lower grades -- it's not just about watching television. Furthermore, some parents may have characteristics that lead them to let children watch more television." The team overcame this problem of inherent habits or behaviours that are difficult to measure -- known as the 'unit-specific effect' -- by using panel data.

Lastly, while television could affect cognitive development which then may be reflected in the children's lower grades, these grades could also, in turn, affect future television watching. Huang gives an example: "If a child watched too much television at age 6, he may get low grades at age 8. When his parents saw these grades, they may have then restricted the number of hours watching television which could, again, have had an impact on the child's grades." This non-static nature of the causal relation, known as the 'dynamic treatment effect with feedback', required the application of a dynamic model and estimation method in the research. For this reason, the researchers adopted the G-estimation method or G-algorithm (originally used in biostatistics) and applied 'standard' econometric panel data approaches. Huang believes that capturing this dynamic, evolving nature of the causal relation is their main contribution to economics literature on the effect of television watching and children's cognitive development.

Child Survey Data

The researchers analysed extensive data from the National Longitudinal Survey of Youth 1979 (NLSY79). Sponsored by the U.S. Bureau of Labour Statistics (BLS), this is a set of surveys providing information on labour force characteristics as well as demographic, social and financial data. The respondents, males and females aged 14 to 22 years when they were first interviewed in 1979, participated in annual surveys up to 1994 after which the surveys were conducted biennially.

The NLSY79 child survey, starting from 1986, offers rich information about the demographic, cognitive, socio-emotional and physiological characteristics of children born to a group of female respondents in the original NLSY79 surveys. Children's data collected from birth up to age 10 were grouped into: 0-2 years, 3-5 years and 6-9 years of age.

Huang and Lee constructed a longitudinal sample of about 2,600 children surveyed from 1986 to 1998, with no missing values in the Peabody Individual Assessment Test (PIAT) in Math and Reading Recognition scores at ages 8-9 years and television watching hours at ages 6-9 years. According to the researchers, PIAT assessments are amongst the most widely used for measuring academic achievement in math and reading.

Regarding television watching, mothers were interviewed about how many hours of television their children watched on a typical weekday and during weekends. However, while examining the data on television watching hours, the research team discovered that some respondents reported more than 24 hours of television watching. Ascribing this discrepancy to "confusion between a daily measure and a weekly measure of TV watching hours", Huang and Lee decided to exclude children who spent more than 10 hours daily in front of the television. Thus the empirical analysis was eventually based on a sample of 2,180 children instead of the original 2,600 children.

PIAT Math and Reading Scores

Their analysis found that children aged 8-9 years spent an average of 3.5 hours each day watching television, while children aged 6-7 years spent an average of 3.2 hours watching television. Breaking down the data further, about 60% of children aged 8-9 years watched over two hours of television per weekday, while 21% in this group spent more than four hours on watching television per weekday. The hours increased during the weekends with 72% exceeding two hours and 35% over four hours. A similar trend was observed in children aged 6-7 years although, in general, the younger children spend fewer hours in front of the television.

With regard to television watching habits across the different ethnic groups, white children aged 6-7 years and 8-9 years watched, on average, about an hour less of television per day as compared with other ethnic groups. In addition, their PIAT math scores were found to be 8.8 points higher and 6.4 points higher in reading. In terms of gender, there was almost no difference in television watching hours and PIAT scores between boys and girls. Interestingly, stated Huang and Lee, "firstborns watch about half an hour less than the others and get higher math and reading scores".

Home and school inputs were also analysed. The researchers found that children aged 8-9 years with 10 or more children's books in their homes watched about 1.2 hours less television. They also scored 11.2 points more in math and 12.1 points more in reading compared with children of the same age group with fewer books at home. Furthermore, children whose mothers read to them at least three times a week and whose parents discussed television programmes with them, spent less time watching television and obtained higher test scores. In addition, they found that television watching hours were "significantly and negatively correlated with other activities such as going to museums and theatres".

In addition, children with mothers possessing 16 or more years of education watched about an hour less of television. Children whose mothers had above average AFQT (Armed Forces Qualification Test) scores spent 1.4 hours less watching television at 8-9 years of age, and around 1.2 hours less at 6-7 years of age. Their PIAT scores were also significantly higher, by 10 points 9 points in math and reading, respectively.

Comparing public and private school children, Huang and Lee found that those studying in public schools spent about an hour more watching television per day at 6-9 years of age. The team also observed that other factors such as "skills of the principal and teachers, how much teachers care about the students, whether parents are given enough information and opportunity to participate in school affairs, the safety and order of the school, and whether moral teaching is offered" did not seem to affect television watching hours, even though they were positively related to math and reading scores.

The analysis on home and school inputs revealed that children in more positive home environments, which included better educated mothers, watched less television. Interestingly, school inputs had relatively lesser influence on television watching patterns.

"TV Effect" May Not Matter

Huang and Lee state found that "watching TV for more than two hours per day during ages 6-9 had a negative total effect at ages 8-9, where the negative effects of TV watching at younger ages 6-7 are much larger". This result was unexpected. A more surprising finding, according to the researchers, is that "between two and four hours TV watching per day seems to bring the best reading scores than too much or too little TV hours, while the effects of TV watching on math scores are usually negative".

According to the researchers, their research results "collectively explain why the effect of TV watching on child cognitive development has been controversial: the effect varies depending on the TV watching age, and it is nonlinear with changing signs. Also its magnitude is small, suggesting that TV effect may not matter that much after

all".

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