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Effect of television viewing on social–emotional competence of young Thai children

Utcharee Intusoma[a], Ladda Mo-suwan[a,*], Nichara Ruangdaraganon[b], Benjaporn Panyayong[c], Virasakdi Chongsuvivatwong[d]

[a] Department of Pediatrics, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand
[d] Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Hat Yai, Songkhla 90110, Thailand
[b] Department of Pediatrics, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand
[c] Department of Mental Health, Ministry of Public Health, Nonthaburi 11000, Thailand

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ABSTRACT

Exposure time, program content and cultural context may affect the impact of television (TV) on the social–emotional competence (SEC) of children. This study examined the effects of TV viewing on the SEC of Thai infants. The study was based on a Thai birth cohort study from which duration and content of TV viewing and data from the Modified Infant–Toddler Social and Emotional Assessment instrument at 1 and 3 years of age were available. Generalized estimating equations were used to examine whether scores below the 10th national percentile were associated with TV viewing duration. The relationship between viewing duration and SEC risk was quadratic rather than linear. Viewing duration of 30–120 min/day was associated with a decreased risk of low overall SEC compared to non-viewers after adjustments for confounding factors. However, the beneficial effect diminished when the duration exceeded 120 min/day. Viewing educational programs was associated with a risk reduction of having low overall SEC compared to non-educational programs. These results suggest that a short period of TV viewing may be beneficial for the SEC of Thai infants, especially if the programs are educational.

1. Introduction

Social competence is a part of emotional intelligence which is an important component in achieving a successful life (Mayer, Roberts, & Barsade, 2008). Various studies have found that 30–70% of infants with low social–emotional competency (SEC) scores have later developed psychiatric or behavioral problems during their school years (Briggs-Gowan & Carter, 2008; Briggs-Gowan, Carter, Skuban, & Horwitz, 2001), and these SEC scores tended to remain low during later childhood years (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006).

As the number of very young television (TV) viewers have increased, there has been some concern whether watching TV is having a detrimental impact on the SEC of these young children. In preschoolers, a recent systematic review found that watching educational programs improved knowledge and imagination, and encouraged proper racial attitudes and self-regulation, while violent programs were associated with poor imagination play and aggressiveness (Thakkar, Garrison, & Christakis, 2006). However, this review focused on the effects of program content without considering viewing duration. In infants and toddlers, studies examining the effects of TV viewing on social competencies have been controversial. For

* Corresponding author. Tel.: +66 74 451251-4; fax: +66 74 426918.
E-mail address: ladda.m@psu.ac.th (L. Mo-suwan).

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instance, an American study (Mistry, Minkovitz, Strobino, & Borzekowski, 2007) showed that sustained TV viewing (>2 h/day) at both 2.5 and 5.5 years of age was associated with problems in attention and social skills at the age of 5.5 years; however, no harm was demonstrated in children who were early but not sustained viewers. Unexpectedly, benefits of TV viewing on children's emotional reactive scale were also noted in that study. Another American survey reported an association between the amount of TV exposure and attention problems at 7 years of age (Christakis, Zimmerman, DiGiuseppe, & McCarty, 2004), but no association was found after reanalysis with a non-linear model by a later study (Foster & Watkins, 2010). To date, there has been no solid evidence that TV viewing <2 h/day is harmful for the SEC of infants and toddlers.

Differences in duration of TV exposure, TV content and cultural contexts among countries may influence the results of studies of this nature (Chen & French, 2008). For instance, common bed sharing with infants in the Thai cultural context (Anuntaseree et al., 2008) may lead to early or heavy TV exposure in Thai children. The recommendations related to TV viewing of the American Academy of Pediatrics (AAP) in 2001 are not well known in Thailand, and many Thai parents may let their babies watch TV, as they consider TV viewing to be beneficial for the baby's cognition and social development (Ruangdaraganon et al., 2009). Furthermore, Asians tend to have a less open communication style but more sensitivity to others' emotions, compared to people from Western countries (Lau, Fung, Wang, & Kang, 2009; Park & Kim, 2008). Thus, variations in etiquette, rearing practices and the way parents value their children's behaviors may affect the social developmental outcomes when the same assessment tool is used in different cultural situations.

The 2006 systematic review referred to above (Thakkar et al., 2006) involved studies carried out in the United States. However, as noted, cultural contexts may have an impact on the findings of studies of this nature, thus before drawing too many conclusions, it would be preferable to have evidence from other countries examining the impact of TV viewing on the development of young children. This study was undertaken to examine the effects of TV viewing on the SEC of infants and toddlers in a Thai birth cohort, the Prospective Cohort Study of Thai Children (PCTC) (Sornsrivichai, Chongsuvivatwong, Mo-suwan, & Intusoma, 2008). The results will help fill the knowledge gap and provide additional information on this important subject from an Asian country.

2. Methods

2.1. Study population and design

Thailand overview: In 2001, Thailand was considered as a lower-middle income country in South East Asia with a population of 67.7 million and Gross Domestic Product of 4608 $US (Source: World Health Organization and United Nations Children's Fund). In a national survey in 2000, more than 75% of Thai children younger than 3 years of age were raised at home by their parents, and approximately 6% were looked after in childcare centers during weekdays (Prateepchaikul & Chaumpluk, 2004). Unlike Western countries, bed sharing with parents is common in Thailand (Anuntaseree et al., 2008). Thai people have a hierarchical culture, and most parents of children under three teach their children to be obedient and always pay respect to other people with the Thai greeting gesture (Prateepchaikul & Chaumpluk, 2004). At that time, the early 2000s, 96% of Thai households owned a television set (Source: National Statistical Office 2003), and having a TV set in the bedroom was common since family members normally live together in the same room. During the study period, there were four free TV channels available in most of the country, with no program rating (TV Classification System began in 2006). Although organizations for children's TV programs have since been set up, a TV survey in 2008 by Konglarb et al. (Thai Health Promotion Foundation Report) reported that the percentage of programs specifically for children aged 6–12 years was about 5% of total air time, and specific programs for children younger than 6 years was less than 1%.

PCTC overview: The PCTC cohort study selected five districts in Thailand, and in these districts all births from October 2000 to November 2002 were enrolled in the study, with parental consent (Sornsrivichai et al., 2008). Four cohorts from a chosen district in each of the four regions and a hospital-based sample in Bangkok (capital city) sites were accessible year-round with average annual 800–900 births and were selected to be geographically and culturally representative of the whole country. For instance, one district included a mountainous suburban district in the North, and included 13% hill tribes people, while two rural districts in the North-East and Central regions included both mountains and plains. Most families were Buddhists except in the rural district in the South where half of the people were Muslims. The children in the Bangkok group were a combination of children from crowded areas such as slums or crowded apartments and others from areas with more space.

The main caregiver of the child was the responder in a face-to-face interview carried out by a trained research assistant. The children were followed at 3, 6 and 12 months of age in the first year of life then every six months until 3 years of age, and the current analysis used data collected at 1 and 3 years of age. Children with significant perinatal problems (birth weight <1500 g, facial anomalies or severe birth asphyxia) were excluded from the analysis.

2.2. Measurements

2.2.1. Main outcome: low social–emotional competence (SEC)

SEC was assessed at 1 and 3 years of age using the Modified Infant–Toddler Social and Emotional Assessment (MITSEA) instrument. The MITSEA was developed in 2001 as a part of the Thai national survey, in which standardized Thai normative values for social–emotional scores were established (Mo-suwan & Pornnoppadol, 2004). The MITSEA adopts all

competence and social relatedness items with the same administration and scoring system as the ITSEA (Carter, Briggs-Gowan, Jones, & Little, 2003) but contains fewer items of the social–emotional problem domains (alpha reliability coefficient of MITSEA = 0.893) (Mo-suwan & Pornnoppadol, 2004). In this report, only the SEC items were scored. All 37 items from MITSEA were administered at 1 year of age while 23 items from the shorter MITSEA were used at 3 years of age. SEC items of the short MITSEA were based on the MITSEA, with certain items omitted based on the clinical judgment of a panel of developmental–behavioral experts who were consulted about the PCTC, in combination with statistical information showing a higher loading of the included items on the ITSEA scale (Briggs-Gowan & Carter, 2001). The MITSEA cards were given one-by-one to a main caregiver. Each card contained a statement, e.g., "Follows rules" or "Plays with toys for 5 min or longer", which the respondent could respond to in four ways, i.e., very true/often (2 scores), somewhat true/sometimes (1 score), not true/rarely (0 score), no opportunity (recode as missing). Scale scores were calculated as means that range from 0 to 2. The overall SEC scores and the scores of each of six component constructs (Compliance, Attention Skills, Imitation/Play, Mastery Motivation, Empathy and Prosocial Peer Relations) were compared to the Thai reference, categorized by sex and age group (Mo-suwan & Pornnoppadol, 2004). In the current study, the outcome of interest was "low SEC" which was defined as a child having a score less than the 10th percentile of the Thai reference.

2.2.2. Main exposure: TV viewing duration and educational program

At 1 and 3 years of age, the caregiver was asked to estimate the average daily TV foreground viewing duration of a child on a typical day during the week prior to the interview. Information on program content was collected at 3 years of age using the question, "What type of program did the child mainly, regularly watch during the week prior to the interview?" As the TV classification system was not established in Thailand at that time, the caregiver was asked to choose only one response from seven choices: (1) cartoons, (2) children's programs (i.e., educational young-child-oriented programs including live action and animated programs without violence), (3) documentaries, (4) entertainment (e.g., drama, variety/game shows), (5) advertisements, (6) sports and (7) news. In our analysis, we considered documentaries and children's programs as educational programs due to their narrative nature and slower pace compared to other programs.

2.2.3. Covariates

In order to determine any association between TV exposure and SEC, several potential confounders were adjusted in multivariate analyses. Information on sex, parents' education, family income and number of siblings was recorded at birth. The child's temperament (easy child, difficult child, slow to warm up or mixed type) was assessed at 1 year of age using a self-reporting questionnaire translated from the Australian Toddler Temperament Questionnaire with a back translation check (Oberklaid, Prior, Sanson, Sewell, & Kyrios, 1990). The remaining variables collected by face-to-face interviews at both 1 and 3 years of age included main caregiver, parent–child interactive play, positive reinforcement and negative reinforcement. The parent–child interactive play variable was obtained by the question "Did you play with your child during the past week?" Two questions – "How do you respond to your child when the child's behavior is satisfactory?" and "What do you do when your child makes you upset?" – were used to measure the level of positive and negative reinforcement, respectively. Any response with "smile", "applaud", "praise" or "hug/kiss" was judged as positive reinforcement, while a response with "spank/hit", "yell/scold" or "scowl" was judged as negative reinforcement, and the total scores were subsequently standardized to a z-score. The z-scores were classified into three categories: "average" ($-1 \leq z\text{-score} \leq 1$), "below average" ($z\text{-score} < -1$) and "above average" ($z\text{-score} > 1$). The total number of recreational places (public park, orchard/field, market/mall, concert/circus, museum, amusement park, cultural show, festival, music school and going abroad) visited between the ages of 18 and 30 months was standardized and categorized in the same fashion.

2.3. Statistical analysis

Demographic data and the main variables were summarized with appropriate descriptive statistics. Only records with complete variables of interest were used in the multivariate analysis. As TV exposure and SEC were assessed twice, the generalized estimating equations (GEE) process was performed to account for intra-subject correlation from repeated measurements. With the GEE, the relationships between the variables of the model from both visits were analyzed simultaneously. Covariates adjusted in the multivariate model included those known to be potential confounders from previous studies (Caspi et al., 2004; Signoretta, Maremmani, Liguori, Perugi, & Akiskal, 2005; Van Hulle, Lemery-Chalfant, & Goldsmith, 2007). Interactions between time and other covariates were checked. Model fittings with both linear (i.e., low overall SEC ~ viewing duration) and quadratic models (i.e., low overall SEC ~ [viewing duration] ^{2} + [viewing duration]) were performed to allow for non-linear relationships. Associations between educational programs and low SEC scores at 3 years of age were separately analyzed using multiple logistic regression. All analyses were performed using the R program (version 2.15.1).

3. Results

3.1. Participant characteristics

From 4245 children recruited at birth, 63 children with significant perinatal problems were excluded, leaving 4182 children in the data set. Twenty-five outliers watching TV ≥ 10 h/day were subsequently excluded due to unreliability of the records. With the remaining 4157 children, the sex ratio was one to

Table 1
TV exposure at 1 and 3 years of age.

Viewing duration (min/day)	1 year (n = 4020)	3 years (n = 3802)
0	23.0	5.3
1–30	62.7	27.8
31–60	9.0	27.7
61–90	0.5	4.1
91–120	2.7	17.9
121–150	0	1.4
151–180	1.1	9.2
>180	0.9	6.7

one. Forty-four percent were only children and one-fifth of the children had at least two siblings. About 10% of the parents had finished higher education and just below 5% were illiterate. The median (interquartile ranges) family income was 333 $US/month.

3.2. TV exposure

At 1 and 3 years of age, data on daily viewing duration were available in 4020 and 3802 children, respectively (Table 1). At these ages, about 77% and 95% of the children watched TV with median (interquartile ranges) viewing durations of 10 (5, 30) and 60 (30, 120) min/day, respectively. While most viewers spent less than 30 min/day watching TV at 1 year, 18% of viewers watched TV more than 2 h/day at 3 years of age. Regarding the program content, 11.3% of the TV viewers watched primarily educational programs at 3 years.

3.3. Prevalence of low SEC

The percentages of study children with a low SEC are shown in Table 2. Most SEC construct comparisons showed a decrease in the percentage of low SEC scores from 1 to 3 years of age except the Attention Skills construct for which the figure was double at the later age. At 3 years, boys had higher percentages of low SEC scores in Attention Skills, Mastery Motivation and Prosocial-Peer Relations compared to girls, while Compliance and Empathy were the problematic constructs in girls.

3.4. Association between viewing duration and overall SEC

Using TV viewing duration as a continuous variable, multivariate (GEE) analysis showed a significant relationship between viewing duration and overall SEC levels. The quadratic model fitness was better than the linear model. The positive quadratic coefficient (0.067) and the negative linear coefficient (−0.416) indicate that the relationship between viewing duration and risk of low overall SEC in this study is a U-liked curve. To make it easier for interpretation, the data were reanalyzed making TV viewing duration an ordinal variable (30 min intervals); the multivariate analysis results are shown in Table 3, and reveal no significant interactions between age and any covariate. Slow to warm up/mixed type temperament was associated with an increased risk of a low overall SEC score, while high mother's education level, visiting more recreational places and positive reinforcement were associated with a lower risk. Changes of odds ratios (ORs) and their 95% CIs from Table 3 are also graphed in Fig. 1 in order to demonstrate the non-linear relationship between TV viewing duration and SEC outcome. From this figure, it can be seen that children with a daily viewing duration of less than 2 h were significantly associated with a lower risk of a low overall SEC score, compared to non-viewers. The lowest risk, which accounted for a 47% risk reduction (OR = 0.53), was observed with a viewing duration of 91–120 min/day. This protective association diminished with a watching duration of more than 120 min/day. A wide range of the 95% CI is noted at the duration of 121–150-min/day, due to the small sample size of this subgroup.

3.5. Association between program content and SEC scores

The multiple logistic regression results between TV program content and low SEC scores is shown in Table 4. From the likelihood ratio test, type of program content was significantly associated with low compliance scores. Watching educational programs gave a significantly lower risk of a low compliance score than watching non-educational programs, with an OR of 0.41. Although educational programs failed to demonstrate a significantly protective effect on overall competence or other SEC constructs, watching educational programs tend to have lower risk than watching non-educational programs. Interestingly, the non-viewers showed a significant higher risk (OR = 1.68) of a low attention score compared to children watching non-educational programs.

Table 2
Percentage of children with low overall SEC scores and low SEC scores in each component construct by age and sex.

	Year 1			Year 3		
	Male n = 2006	Female n = 2024	Total n = 4030	Male n = 1902	Female n = 1923	Total n = 3825
Overall SEC	16.7	16.7	16.7	6.6	4.2	5.4‡
Compliance	12.8	8.1	10.4‡	4.2	20.0	12.1‡
Attention Skills	4.1	4.0	4.0	10.6	6.1	8.4‡
Imitation/Play	7.3	6.0	6.7	3.0	2.9	2.9
Mastery Motivation	17.8	17.3	17.5	2.6	1.2	1.9‡
Empathy	13.1	10.0	11.5†	3.6	7.2	5.4‡
Prosocial-Peer Relations	14.1	12.4	13.2	13.3	9.6	11.4‡

†$p < 0.05$, ‡$p < 0.01$.
Chi-squared test comparing percentages by sex.

Table 3
Multivariate (GEE) analysis predicting low overall SEC.

	Odds ratio	(95% CI)
Temperament (ref: easy)		
Slow to warm up/mixed	1.68	(1.40, 2.02)§
Difficult	1.80	(1.32, 2.45)§
Mother's education (ref: illiterate)		
<Bachelor	0.96	(0.67, 1.37)
≥Bachelor	0.45	(0.24, 0.83)‡
Recreational places visited (ref: <average)		
Average	0.72	(0.54, 0.94)†
>Average	0.45	(0.32, 0.65)§
Positive reinforcement (ref: <average)		
Average	0.62	(0.52, 0.75)§
>Average	0.59	(0.27, 1.28)
TV viewing duration (min/day) (ref: 0)		
1–30	0.86	(0.70, 1.06)
31–60	0.64	(0.46, 0.87)‡
61–90	0.57	(0.26, 1.28)
91–120	0.53	(0.34, 0.82)‡
121–150	0.37	(0.05, 2.77)
151–180	0.55	(0.31, 0.98)†
>180	0.66	(0.35, 1.23)

GEE testing adjusted for gender, main caregiver, family income, father's education, number of siblings, interactive play and negative reinforcement.
† $p < 0.05$.
‡ $p < 0.01$.
§ $p < 0.001$.

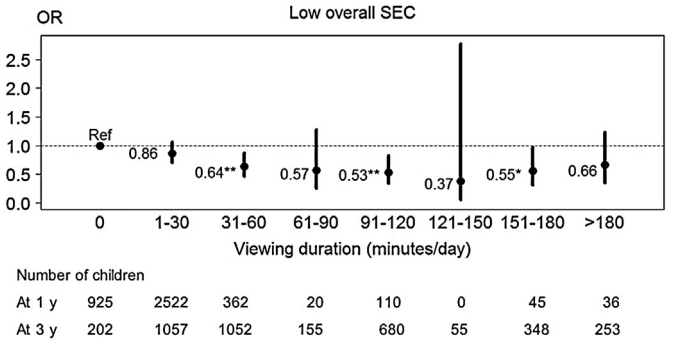

Fig. 1. Non-linear relationship between risk of low overall SEC and viewing duration. OR = odds ratio, Ref = reference (non-viewing), $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. Black dots represent OR, vertical bars represent 95% CI.

4. Discussion

The association of TV viewing observed in this study suggests that an optimal daily viewing duration might promote healthy social–emotional development in very young children. This finding is at some variance with AAP recommendations discouraging TV viewing before the age of 2 years; however, the study does confirm, if in a non-significant way, prior reports involving childhood and adolescent television watching that viewing more than 2 h/day might be unhealthy (Ozmert, Toyran, & Yurdakok, 2002). It also confirms the beneficial effects of educational programs on childhood development (Thakkar et al.,

Table 4
Multiple logistic regression predicting low overall SEC scores and low SEC scores by construct.

	OR (95% CI)						
	Overall	Compliance	Attention	Imitation	Mastery	Empathy	Prosocial
TV programs (ref = non-educational)							
Educational	0.63 (0.32, 1.22)	0.41 (0.24, 0.70)†	0.76 (0.46, 1.25)	0.80 (0.34, 1.90)	1.60 (0.73, 3.50)	0.96 (0.54, 1.71)	0.75 (0.50, 1.14)
Non-viewing	1.23 (0.65, 2.33)	1.31 (0.81, 2.09)	1.68 (1.03, 2.75)†	1.56 (0.76, 3.21)	1.07 (0.32, 3.57)	0.76 (0.36, 1.62)	0.79 (0.47, 1.35)
LR test *p*-value	0.270	<0.001	0.064	0.419	0.533	0.759	0.284

LR test *p*-value = *p*-value from likelihood ratio test.
† $p < 0.05$ (p-value from Wald's test) after adjustment for covariates.

2006), and, importantly, this paper demonstrates that differences in analytical methods and culture may play important roles in studies on childhood development.

Analysis of our findings in the light of other current research suggests that exploration of non-linear relationships should be performed in conditions in which both pros and cons are considered. Explaining the relationship between TV viewing duration and risk of a low overall SEC score was better demonstrated in a quadratic model than in a linear model. The U-shaped relationship between viewing duration and the risk observed in this analysis suggests that an optimal watching duration for children is from 30 to 120 min/day, with the beneficial effects diminishing when viewing time exceeds this range. The importance of analysis with a non-linear model has been previously shown in studies examining the association between TV viewing and attention problems (Foster & Watkins, 2010). After additional adjustments for maternal education and family income as well as using the better fitting semi-parametric model, the reanalysis (Foster & Watkins, 2010) of the data from a previous study (Christakis et al., 2004) found that TV viewing exceeding 2 h/day was no longer associated with attention problems. Unexpectedly, non-viewers in our Thai cohort had a higher risk of having a low SEC score than the TV viewers. A contextual difference between developing and developed countries may be involved in this finding. In our cohort, viewing duration and family income were associated in a positive linear fashion, with the non-viewers in the lowest socioeconomic levels, while the situation in US studies was opposite, with lower viewing hours associated with the highest income levels (Mistry et al., 2007). Although the family income and parents' education variables were adjusted in the multivariate analysis, some might wonder if there might be some untested confounding effect related to underprivileged conditions in the non-viewers. Thus, to test the robustness of our results, we additionally performed subgroup analysis ($n = 2535$), excluding children in the lowest family income quartile, and similar findings were obtained. A significant quadratic term (in the quadratic model) and the non-harmful effects of viewing duration of 30–120 min/day were observed in both the whole-group and sub-group analyses which confirmed the validity of the findings. Contextual factors related to Thai TV programs and child rearing techniques need to be further scrutinized to help clarify these differences.

Similar to earlier studies conducted among preschoolers (Christakis & Zimmerman, 2007; Lee, Bartolic, & Vandewater, 2009), we observed that watching educational programs during the infancy and toddler periods showed greater benefits than non-educational program viewing. One unique aspect of our study was that none of the previous studies had looked specifically at children's compliance. Of all six constructs of the MITSEA in this study, Compliance had the strongest relationship with TV exposure in terms of both viewing duration and program content. Having compliance, to a certain degree, may be viewed as obedience, which is a positive societal value in Asian cultures (Weisz et al., 1993), and which might be integrated into the content of local children-oriented programs and, if so, could have led to a better compliance score. Again, further studies are needed to explore this issue. Our findings confirmed earlier studies (Ullrich, Carroll, Prigot, & Fagen, 2002; Vaughan Van Hecke et al., 2007) that a child's temperament is related to SEC. Our findings also support previous reports of a positive association between having an educated mother and positive reinforcement with the child's self-regulation and social competence (Hoglund & Leadbeater, 2004; Shinohara et al., 2010). The explanation for benefits related to visiting recreational places in our findings might be that family recreational activities give children more opportunities to acquire social skills and learn self-control in a changing environment, and improve family interaction and problem-solving skills (Caldwell & Witt, 2011).

There are a number of strengths of this study. First, the results are based on repeated measurements of viewing habits at different years, with analysis of a relatively large sample size with a high response rate (>90% at each visit). Similarly, prospective data collection minimized the recall bias which is a common feature of case–control studies. Also, several important potential confounders were adjusted for in the analysis, notably temperament and variables related to rearing practices (Carter et al., 2003). Nevertheless, there might be a potential limitation concerning this, as other potentially confounding characteristics of individuals and their families such as maternal depression were not checked or therefore adjusted for in our model (Fernald, Jones-Smith, Ozer, Neufeld, & DiGirolamo, 2008). As mentioned in the introduction, program ratings were not available in Thailand until 2006, and at the time of the study data collection, and thus in our analysis, documentaries and children's programs were defined as educational programs because of their narrative nature and a slower pace than "adult" TV shows, some of such shows may not conform entirely to such features. A more in-depth study could consider things such as the number of scene changes and program content to get a better sense of the mechanism of benefit. Also, the benefits of limited TV viewing on SEC that we found may be transient, and a longer follow-up time is needed to investigate the dynamics of exposure on SEC and other aspects of health.

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