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Educational TV Consumption and Children's Interest in Leisure Reading and Writing: A Test of the Validated Curriculum Hypothesis

**Jakob D. Jensen, Nicole Martins, Jeremy Weaver,
and Chelsea Ratcliff**

The relationship between children's TV consumption and literacy outcomes is currently unclear, as past research has identified both linear and curvilinear trends. One explanation for the contradictory results is the varying content children consume; specifically, researchers have argued that research-based educational TV programming should be positively related to literacy outcomes whereas non research-based programming should be negatively related to literacy outcomes (what we refer to as the validated curriculum hypothesis). To test this hypothesis, students in grades 4 and 5 (N = 120) completed a survey assessing educational TV consumption and leisure reading/writing behaviors. The results upheld the validated curriculum hypothesis and revealed several key moderators including composite TV consumption and parents' reading behavior.

Learning to read and write is a fundamental goal of education; yet many students graduate unable to function beyond the minimum standards of literacy (Nueman, Copple, & Bredekamp, 2000). Thus, experts agree that the United States is experiencing a literacy crisis (see Haynes, 2011; Nueman et al., 2000). As a result, the methods used to teach reading and writing have become the subjects of controversy (Pinkham & Neuman, 2012). Noticeably absent from this debate about teaching methods, however, is a consideration of the environmental factors that might nurture reading and writing among children. For example, cultivating children's motivation to read and write for pleasure, a key predictor of literacy ability in

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adulthood (e.g., Sanacore, 2002), is a valuable step toward ensuring they will have strong literacy skills.

One environmental factor that may cultivate leisure reading and writing behavior in children is the mass media. To date, research has yielded conflicting results on this issue with studies finding both linear (positive and negative) and curvilinear trends (e.g., Ennomoser & Schneider, 2007). Despite ambiguity in the research literature, discussions on the effects of television on children's literacy have often focused on the negative (e.g., Huston, Wright, Marquis, & Green, 1999). Far less attention has been paid to potential positive effects of educational media on children's literacy behavior (e.g., Fisch, 2009). This is unfortunate as many television programs posit educational benefits, and both parents and researchers are interested in the impact such programming has on children.

The current study engages this question by examining the impact of two forms of educational TV content: research-based (RB) programming and non research-based (NRB) programming. RB programming is created specifically to teach children by using an educational curriculum developed by a team of experts (e.g., *Between the Lions*) whereas NRB programming is labeled educational but lacks the same curricula support (e.g., *Boohbah*). It has been suggested that this distinction may explain conflicting results as RB and NRB programming are thought to be positively and negatively related to literacy outcomes, respectively (Kirkorian, Wartella, & Anderson, 2008). Henceforth, we refer to this idea as the validated curriculum hypothesis. To date, no study has directly compared RB and NRB programming on children's literacy activities; thus, the veracity of the validated curriculum hypothesis is currently unknown.

Leisure Reading and Writing

Leisure reading is reading that is done out of one's own free will, and typically involves materials that reflect one's own choice, at a time and place that suits the individual reader (Clark & Rumbold, 2006). Children who read for fun have increased vocabulary skills (McKool, 2007) and more positive attitudes toward reading (Guthrie & Alvermann, 1999). More favorable attitudes are linked to reading achievement (McKenna & Kear, 1990) and pleasure reading later in life (Aarnoutse & van Leeuwe, 1998). Thus, becoming a lifetime reader is predicted by developing a love of reading at a young age (Sanacore, 2002).

Despite these benefits, evidence indicates that few children engage in leisure reading. In a seminal study on children's reading for pleasure, Walberg and Tsai (1984) asked 2,890 thirteen-year-olds how much time they spent leisure reading the day before. The study showed that nearly half of the sample (44%) marked "none" whereas only 5% indicated they read for more than three hours the previous day. A more recent study provides similar results: Juster, Ono, and Stafford (2004) surveyed more than 3,000 children aged 6–17 about how they spent their leisure time via 24-hour time-use diaries. The study showed that

children engaged in leisure reading for about one hour and 17 minutes per week. To put this statistic into context, this amount represented less than 9% of children's total television viewing time, which occupied nearly 15 hours per week at the time the study was conducted. The results also showed that leisure reading declines over time. When the authors averaged the weekly time expenditures across four different age groups (6–8, 9–11, 12–14, 15–17), they found that older teens engaged in leisure reading the least averaging 50 minutes per week, or 7–10 minutes per day.

Less is known about leisure writing. Much of the literature concerning children's literacy focuses on the importance of reading. The assumption here is that developing a child's ability to read produces better readers *and* writers. Nonetheless, children do write for pleasure. Moje, Overby, Tysvaer, and Morris (2008) surveyed more than 1,000 students in 6th–10th grade in a predominately Latino community. The study found that adolescents do write outside of school; however, they do not write texts that adults typically value. For example, students in this study reported that when they wrote "outside of school" they did so most often by emailing, chatting, and blogging. When asked if they wrote short stories or poetry (i.e., creative writing), most students reported that they engaged in these kinds of activities less than once per week.

If we consider blogging a form of leisure writing, then some evidence indicates that this may be a popular leisure activity among youth. A study by Herring, Kouper, Scheidt, and Wright (2004) suggests that a significant portion of the total blog population is inhabited by writers younger than 20 years of age. What is unknown is the trajectory of leisure writing over time, and whether environmental factors, such as parental influences or the media, can encourage leisure writing.

Television and Literacy

Much research attention has been devoted to unpacking the relationship between television viewing and reading. Yet published studies offer contradictory results. For example, some researchers have found a negative linear relationship between television viewing and reading, such that television displaces time children could have spent reading and/or engaging in other activities that are thought to promote reading skills (see Beentjes & van der Voort, 1988). Other researchers have argued that the relationship between television viewing and reading is curvilinear (Ennomoser & Schneider, 2007). In her classic study, Neuman (1988) synthesized eight statewide assessments of the National Assessment of Educational Progress, and noted that differences in reading scores were minimal among children who watched less than four hours of television per day. However, reading scores dropped sharply among children who watched more than four hours. Some researchers even report a positive relationship, arguing that reading skills actually improve as a result of reading subtitles on the screen (Koolstra, van der Voort, & van der Kamp, 1997).

The likely culprit for these contradictory findings concerns the measure of television exposure used in these studies. The majority of the research conducted in this

arena has focused on time spent with the television and not on the content that was watched. Content is of crucial importance to this debate, because *educational* programming is correlated with learning outcomes in children, whereas exposure to entertainment content is associated with poorer cognitive development and lower academic achievement (see Kirkorian et al., 2008 for a review).

To date, the most researched children's educational television program is *Sesame Street*. In the short-term, studies of three- to five-year-olds show that heavy viewers of *Sesame Street* have higher skills related to the alphabet, numbers, and shapes than do lighter viewers (Fisch & Truglio, 2001). In the long run, longitudinal studies show that exposure to educational programs like *Sesame Street* in preschool is associated with significantly higher grades in English, math, and science in high school, even after statistically controlling for other known predictors of academic performance (e.g., language skills, family background). Of particular import to the current study, these studies also found that educational television viewing in preschool is associated with more leisure reading in high school (Fisch & Truglio, 2001).

Sesame Street is a model for success because of the way it is produced and created. The creation of every episode of *Sesame Street* is a collaborative one, involving a team of educators, producers, and researchers. Moreover, each program is designed to teach a specific curriculum goal, and each program is tested and refined before it is aired to ensure that viewers learn the intended lesson (i.e., it is an example of RB programming). It should come as no surprise, then, that other shows that have used similar production models have demonstrated parallel effects. For example, *Between the Lions* is another PBS series that teaches concepts of print, phonemic awareness, and letter-sound correspondence among early readers. Linebarger (2000) presented 17 half-hour episodes to children in kindergarten and first grade over a period of 3–4 weeks. Using an experimental pretest/posttest design, viewers' and non-viewers' reading performance was assessed on several levels: specific program content, emergent literacy skills such as letter naming, and more generalized reading ability via a standardized test. The study showed that kindergarten viewers performed significantly better than non-viewers across all three measures, even after statistically controlling for a variety of background variables. However, there were no significant differences among first graders, largely due to a ceiling effect; that is, first graders already possessed the bulk of skills that *Between the Lions* teaches. Thus, when programs are designed to teach a specific educational skill rather than merely entertain, they often produce the intended results among the target child audience (Kirkorian et al., 2008).

Yet many programs that claim to be educational are not RB programming. For example, *The New Adventures of Winnie the Pooh* was labeled as a literacy program because it was based on a popular children's book series (Fisch, 2009). However, the program was not created, written, or produced in the same way that programs such as *Between the Lions* are. Research supports the idea that not all educational programs are cut from the same cloth. In their study of infants' and toddlers' television viewing and learning outcomes, Linebarger and Walker (2005) found that early exposure to programs like *Blue's Clues* was positively related to subsequent language

vocabulary and expressive language, whereas viewing *Teletubbies* was negatively related to these outcomes. The authors concluded that the loose narrative structure and “baby talk” modeled in *Teletubbies* was likely responsible for the negative effect.

Although several studies have examined the relationship between educational programming and school readiness (Fisch, 2009), there are far fewer studies that have attempted to link educational television to children’s motivation to read and write for pleasure. Linebarger’s (2000) study provides some evidence that educational programming can stimulate motivation to read and write for fun. In that study, first grade viewers of *Between the Lions* were significantly more likely than non-viewers to read books alone or write during free time. To our knowledge, the only program created specifically to encourage leisure reading and writing was *Ghostwriter*. *Ghostwriter* was a RB television series created for children aged 7–10 that aired from 1992–1995. The program featured a team of children who effectively used reading and writing to solve mysteries with the aid of Ghostwriter, an invisible ghost who could only communicate via reading and writing. A primary goal of the program was to provide compelling opportunities for the child viewer to read and write (Williams & Hall, 1994). Although the results of *Ghostwriter*’s effectiveness are proprietary, Fisch (2009) reports that the show was successful in meeting its mission. Not only did viewers choose to read the print that was shown on screen in *Ghostwriter*, but more than 500,000 children participated in *Ghostwriter* mail-in contests that required viewers to engage in activities like writing an original song or creating their own superhero. Thus, it seems this show was particularly effective in its ability to motivate children to read and write for pleasure.

Theoretical Explanations for the Relationship Between Educational TV and Literacy

Having established that exposure to educational programs is associated with positive learning outcomes such as school readiness and reading comprehension, what theoretical mechanisms are responsible for these effects? One theoretical explanation is Anderson, Huston, Schmitt, Linebarger, and Wright’s (2001) early learning model (ELM). This model accounts for the effects of exposure to educational television content over time, by positing that early educational television viewing influences pre-academic skills, motivation, readiness to learn, and social behavior patterns (e.g., absence of restlessness and distractibility) with which children enter the first years of schooling. The model further predicts that early educational television viewing results in an upward spiral, such that children who watch educational television come to school with the necessary skills for academic success. As a result, children who demonstrate good skills at the onset of their education are likely to be placed in higher aptitude groups, receive more attention from their teachers, and be academically motivated (Entwistle,

Alexander, & Olson, 1997). In addition, these early successes are correlated to the types of activities in which children choose to engage; for example, skilled readers may choose to read more on their own. Thus, ELM posits that early exposure to educational television is predictive of academic success, which in turn predicts successful long-term learning trajectories.

ELM also assumes that children who do *not* watch educational television will not experience the same long-term success. One explanation for this downward trajectory concerns the way NRB programs are produced. Fisch's (2009) argues that NRB programs tax the working memory of young viewers because they typically present narrative content and educational content at the same time. Indeed, this idea is supported by Lang's limited capacity model of motivated mediated message processing (LC4MP; Lang, 2000, 2006). A major assumption of LC4MP is that individuals have a limited amount of cognitive resources to dedicate to perception, understanding, and memory. The theory further assumes that because cognitive resources are limited, they may become depleted by complex messages. Applied in this context, viewers' mental resources become strained when trying to process not only the educational content but also the narrative in which it is fixed. Thus, educational programs are most successful when educational information and the narrative information are integrated (Fisch, 2009). When this happens, the mental resources available for understanding both types of content complement rather than compete with each other, and both types of information are processed equally well. This model is consistent with a large body of existing research on children's comprehension of television (for a review, see Fisch, 2009).

In summary, available research suggests that educational media may yield positive educational benefits. The early learning model would predict that exposure to RB programming may contribute to children's academic success by encouraging increased leisure reading (H_{1a}) and writing (H_{1b}). These early successes then impact the kinds of activities in which children choose to engage, such that good readers or writers may choose to read or write more during their free time. In contrast, LC4MP would predict that exposure to NRB programming may strain mental resources and hinder knowledge retention, a situation that decreases the odds children will engage in leisure reading (H_{2a}) or writing (H_{2b}). We refer to this pattern of findings as the validated curriculum hypothesis.

Moderating Variables

Exposure to educational television programming may not affect all children in the same way. The impact of educational television exposure depends on several factors that might make these shows more beneficial for some viewers than for others. One such factor is sex of the child. A comprehensive review of the research literature conducted by the National Endowment of the Arts (2007) noted that across age demographics, girls and women

spend more time leisure reading than boys and men. As a result, girls and women score higher on reading and writing tests than their male counterparts.

One explanation for this difference could be that boys spend more time with the media. A recent study by the Kaiser Family Foundation (Rideout, Foehr, & Roberts, 2010) reveals that boys spend about an hour more with the media than girls do each day (11 versus 10 hours, respectively). In contrast, girls are significantly more likely to read than boys each day (43 versus 33 minutes respectively). It follows that boys who watch more television spend less time reading, which is related to poorer academic performance and less motivation to read. However, there is no evidence of a sex difference when it comes to exposure to educational television. Thus, the sex gap in reading scores between boys and girls is not due to the fact that girls watch more educational television than boys do. Presumably, if girls and boys watch equal amounts of educational television, we should see similar effects on literacy. Given the role sex might play in the relationship between exposure to educational television and literacy outcomes, we asked whether the relationship between educational television consumption in early childhood and leisure reading (RQ₁) and writing (RQ₂) was moderated by sex.

A second variable that may moderate the relationship between educational TV consumption and literacy outcomes is overall time spent with television. Scholars have noted that too much television often results in poorer academic outcomes presumably due to displacement (see Kirkorian et al., 2008). In this case, it would not matter how much educational television a child is watching. If he or she is spending too much time with television overall, then there will be little opportunity to engage in leisure reading and writing activities. On the other hand, the aforementioned Kaiser Family Foundation study (Rideout et al., 2010) found that American children aged 8–18 years old are media multitaskers. That is, children use more than one medium at a time. In fact, the study showed that more than 50% of the adolescents sampled reported using another medium “most” or “some” of the time while they were reading. Thus, it could be that leisure reading and writing activities take place even if the TV is on. Therefore, we also asked whether the relationship between educational television consumption in early childhood and leisure reading (RQ₃) and writing (RQ₄) was moderated by current TV consumption.

A third variable to consider in the relationship between early educational television consumption and leisure reading and writing is family literacy habits. Evidence indicates that parental and sibling leisure reading is positively related to children’s interest in leisure reading (Lenhart & Roskos, 2003; McKool, 2007). For example, McKool (2007) examined children’s motivations to read for pleasure in a study of 199 fifth graders. The study showed that avid readers were more likely to report that their parents or siblings read books recreationally than were reluctant readers. McKool concluded that when recreational literacy activities are modeled regularly, the likelihood that children will engage in leisure literacy activities increases. However, whether family literacy habits moderate the relationship between early educational television exposure and childhood leisure reading (RQ₅) and writing (RQ₆) is unknown.

Methods

Sample

The survey was conducted in a mid-size town located in the Midwest. Past research has found that lifetime leisure reading and writing habits tend to solidify around the fifth grade (e.g., McKenna, Ellsworth, & Kear, 1995); thus, fourth and fifth graders ($N = 120$) were recruited to the study from two local schools. One of the schools was a public elementary school (kindergarten through fifth grade) and the other was a private Christian school (kindergarten through twelfth grade). Students were asked to complete a brief survey in exchange for a small reward (a \$3 yo-yo). The schools were also provided with compensation on a per student basis (\$5 per student). None of the relationships examined in this study varied by school (i.e., public versus private), so that variable is not included in the analyses.

Participants ranged in age from 8–12 years old ($M = 10.27$, $SD = .87$) and were evenly split in terms of sex (59 girls, 59 boys, 2 missing data). Slightly more fourth graders ($n = 67$) participated than fifth graders ($n = 49$). The sample was diverse compared to the U.S. population: 56.8% White, 9.3% Black, 17.8% Hispanic/Latino, 2.5% Asian/Pacific Islander, 0.8% Native American/American Indian, 5.9% other, and 6.8% checked multiple racial categories.

Procedure

Principals of elementary and middle schools in the area were contacted through mail. The mailings explained the purpose of the study, the benefits to the school, and the benefits to the students. Thirty-five letters were mailed out to local principals and two schools responded.

Once a suitable time had been established between the researchers and the teachers, researchers visited individual classrooms to recruit students. On the first visit, researchers provided all students with consent packets that needed to be taken home to their parents to be signed and then brought back to the school. A drop box was then left in the classroom for approximately one week to collect returned packets. After sufficient time had passed, the researchers contacted the teachers again to set up a second visit.

During the second visit, students with complete consent packets were allowed to participate in the study. Before beginning, students were informed that the study concerned reading and writing for fun and that they should think about non-school reading and writing when answering those questions. Surveys were then passed out to participating students. Researchers and homeroom teachers monitored participants and answered questions during the survey.

Outcome Variables

Leisure Reading/Writing. Participants responded to a question that asked, “How often do you do these things?” Several activities were located below the question. Participants indicated how often they did each of the activities using a four-point scale (“never,” “a little,” “a lot,” “always”; scored 1–4). Two of the activities listed were “read books for fun” ($M = 2.47$, $SD = 1.04$) and “write stories for fun” ($M = 1.82$, $SD = .85$).

Predictor Variables

RB Programming Consumption. Participants were provided with a list of four children’s programs that aired in the region of the study when the children were 3–6 years of age. That age range has been identified as crucial from a literacy and developmental standpoint (Wellman et al., 2011).

Early childhood consumption of two RB educational TV programs was measured with the question, “How much did you watch [*Between the Lions*, *Reading Rainbow*] growing up?” For each program, participants were provided with four response options: *never*, *a little*, *a lot*, *always*. Responses to the two items were combined into an RB programming consumption index ($M = 1.93$, $SD = .88$).

NRB Programming Consumption. Early childhood consumption of two NRB educational TV programs was measured with the question, “How much did you watch [*Boobah*, *Teletubbies*] growing up?” For each program, participants were provided with four response options: “never,” “a little,” “a lot,” “always.” Responses to the two items were combined into an NRB programming consumption index ($M = 1.74$, $SD = .79$).

Program selection was influenced by the Ready to Learn program funded for the past 15 years by the Department of Education, the Corporation for Public Broadcasting, PBS, local media stations, and other private donors. Ready to Learn capitalized on the research recommendations of the National Reading Panel to develop and refine children’s educational programming that would “emphasize the fundamental skills necessary to raise a nation of readers” (Corporation for Public Broadcasting, 2011, p. 1).

Ready to Learn has supported research-based programming for PBS including *Between the Lions* and *Reading Rainbow*. These two programs were selected because (1) they specifically address literacy skills, (2) they are part of the Ready to Learn initiative, and (3) they were televised on local PBS stations when the participants of this study were in their formative years. *Boobah* and *Teletubbies* were selected as NRB programs because (1) they do not have research-based content, (2) they claim to be E/I (Educational/Informational) content, and (3) they were televised on area broadcast stations when the participants of this study were in their formative years.

Controls/Moderators

Demographics. Sex was measured with a close-ended item (*male, female*) and age was measured with an open-ended item (“How old are you?”).

Parent/Sibling Leisure Reading Behavior. Children were asked to respond to the following statements, “My parents like to read for fun” and “I like reading books with my brothers and sisters” using 7-point response scales ranging from *strongly disagree* to *strongly agree* (Parents: $M = 3.26$, $SD = 1.33$; Siblings: $M = 2.73$, $SD = 1.33$).

TV Consumption—Composite Week. Children’s current TV consumption was measured by asking their parents (in the consent packets) to report how many hours of TV their child watched on a typical weekday and on a typical weekend day. Responses to these two questions were transformed into a composite week: weekday hours $\times 5$ + weekend hours $\times 2$ ($M = 21.26$, $SD = 11.77$).

Power Analysis

G*Power was utilized to calculate the power of the design to detect an increase in R^2 in a linear multiple regression analysis ($\alpha = .05$, 4 tested predictors, 9 total predictors, $N = 120$). Three power analyses were conducted for three standard effect sizes, small ($f^2 = .02$), medium ($f^2 = .15$), and large ($f^2 = .35$) (Faul, Erdfelder, Buchner, & Lang, 2009). The design had excellent power to detect a large (.99) or medium effect (.94), and moderate power to detect a small effect (.63).

Results

To address the hypotheses and research questions, eight hierarchical regressions were carried out with leisure reading and writing as the dependent variables and the other variables entered by block: block 1 (age, sex, TV consumption—composite week, parent/sibling leisure reading behavior), block 2 (RB programming consumption, NRB programming consumption), block 3 (interactions). All continuous predictors were centered per the guidelines of Aiken and West (1991) (see Table 1).

Educational TV Consumption—RB/NRB and Reading/Writing

For leisure reading, the analysis was significant at block 1, $r = .40$, $R^2 = .16$, F change (5, 98) = 3.61, $p = .005$, and block 2, $r = .48$, $R^2 = .23$, F change (2, 96) = 4.33, $p = .016$. An examination of individual predictors at each block revealed that sibling reading and RB exposure were positively related to leisure

Table 1
Hierarchical Regression Analyses Predicting Children's Leisure Reading and Writing Behavior

	Reading			Writing		
	<i>b</i> (<i>SE</i>)	<i>t</i>	$R^2\Delta$	<i>b</i> (<i>SE</i>)	<i>t</i>	$R^2\Delta$
Block 1: Age	-.02 (.11)	-.20	.16**	.02 (.09)	.17	.08
Sex	.12 (.20)	.60		-.12 (.17)	-.70	
TV Consumption	-.12 (.10)	-1.17		.05 (.09)	.59	
Parent Reading	.03 (.10)	.29		.02 (.09)	.28	
Sibling Reading	.35 (.11)**	3.23		.24 (.09)**	2.68	
Block 2: Edu TV – RB	.31 (.11)**	2.80	.07*	.26 (.10)**	2.75	.07*
Edu TV – NRB	-.25 (.11)*	-2.18		-.08 (.09)	-.90	
Block 3a: RB × Sex	-.02 (.23)	-.10	.00	-.30 (.19)	-1.57	.03
NRB × Sex	-.13 (.23)	-.59		.26 (.19)	1.36	
Block 3b: RB × TV	.19 (.13)	1.46	.06*	-.15 (.11)	-1.32	.02
Consumption						
NRB × TV	-.46 (.17)**	-2.69		-.06 (.15)	-.38	
Consumption						
Block 3c: RB × Parent	-.01 (.14)	-.07	.00	-.03 (.11)	-.29	.05†
Reading						
NRB × Parent Reading	.03 (.12)	.27		.19 (.09)†	1.98	
Block 3d: RB × Sibling	-.02 (.13)	-.12	.00	.12 (.11)	1.10	.02
Reading						
NRB × Sibling	.08 (.12)	.64		-.01 (.10)	-.03	
Reading						
<i>N</i>		113			110	

Notes. Hierarchical regression analysis with $R^2\Delta$ reported for each block. To minimize power loss, separate regressions were carried out for each set of interaction variables, labeled 3a – 3d. All variables (except Age and Sex) were mean centered. † $p < .10$ * $p < .05$ ** $p < .01$

reading (support for H_{1a}) whereas NRB programming consumption was negatively related to leisure reading (support for H_{2a}) (see Table 1).

For leisure writing, the regression was significant at block 2, $r = .39$, $R^2 = .15$, F change (2, 93) = 3.92, $p = .023$, but not block 1, $r = .29$, $R^2 = .08$, F change (5, 95) = 1.72, $p = .138$. An examination of individual predictors at block 2 revealed that RB programming consumption was positively related to leisure writing (support for H_{1b}).

Moderator Analysis: Sex

RQ_1 – RQ_2 queried whether sex moderated the relationship between exposure and literacy behaviors. To minimize power loss, separate regressions were

conducted for each set of interactions (blocks 3a–3d in Table 1). Sex (block 3a) was not a significant moderator for leisure reading, $r = .48$, $R^2 = .23$, F change (2, 94) = .27, $p = .766$, or writing, $r = .43$, $R^2 = .18$, F change (2, 91) = 1.48, $p = .234$.

Moderator Analysis: TV Consumption—Composite Week

RQ₃–RQ₄ queried whether current TV consumption moderated the relationship between exposure and literacy behaviors. TV consumption – composite week (block 3b) was a significant moderator for leisure reading, $r = .53$, $R^2 = .28$, F change (2, 94) = 3.81, $p = .026$, but not for writing, $r = .42$, $R^2 = .18$, F change (2, 91) = 1.28, $p = .282$. An examination of block 3b revealed a significant interaction between educational NRB programming consumption and TV consumption for leisure reading. Per the guidelines of Hayes and Matthes (2009), the interaction was probed at one standard deviation above and below the mean of TV consumption—composite week.

NRB programming consumption was negatively related to leisure reading for individuals with TV consumption 1 standard deviation above the mean ($b = -.64$, $SE = .20$, $t = -3.17$, $p = .002$, 95% CI for b : -1.0393, -.2389) and at the mean ($b = -.25$, $SE = .11$, $t = -2.31$, $p = .023$, 95% CI for b : -.4729, -.0359), but not one standard deviation below the mean ($b = .13$, $SE = .20$, $t = .67$, $p = .507$, 95% CI for b : -.2575, .5179). In other words, NRB programming consumption was negatively related to leisure reading for those children who currently consumed average or more TV. Light TV consumers did not exhibit the negative effect (see Figure 1). The interaction explained approximately 4% of the variance in leisure writing behavior, R^2 change for the interaction = .04, $F(1, 95) = 5.43$, $p = .022$.

Figure 1
Interaction Between NRB Programming Consumption and TV Consumption

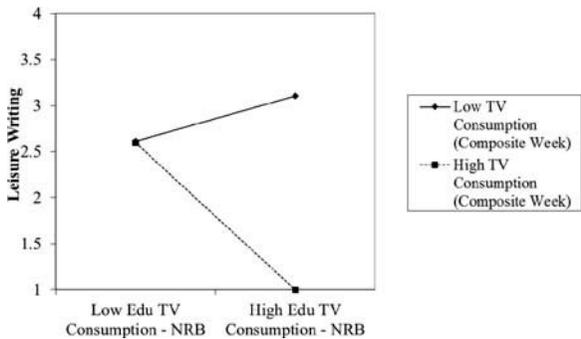
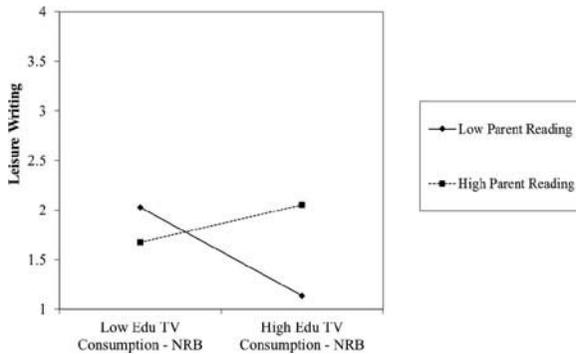


Figure 2
Interaction Between NRB Programming Consumption and Parent Reading Behavior



Moderator Analysis: Family Literacy Habits

RQ₅–RQ₆ queried whether family literacy habits (parent and sibling reading behavior) would moderate the relationship between exposure and literacy behaviors. Parent reading (block 3c) was not a significant moderator for leisure reading, $r = .48$, $R^2 = .23$, F change (2, 94) = .05, $p = .950$, but it was for leisure writing, $r = .46$, $R^2 = .21$, F change (2, 91) = 3.09, $p = .050$. For leisure writing, an examination of block 3c revealed a significant interaction between educational NRB programming consumption and parent reading. NRB programming consumption was significantly related to leisure writing for individuals with parent reading scores 1 standard deviation below the mean ($b = -.24$, $SE = .11$, $t = -2.15$, $p = .035$, 95% CI for b : $-.4556$, $-.0175$), but not at the mean ($b = -.07$, $SE = .09$, $t = -.75$, $p = .458$, 95% CI for b : $-.2511$, $.1140$), or one standard deviation above the mean ($b = .10$, $SE = .12$, $t = .84$, $p = .401$, 95% CI for b : $-.1347$, $.3336$). In other words, NRB programming consumption was negatively related to leisure writing for children with non-reading parents. Children with parents who liked to read did not exhibit the negative effect (see Figure 2). The interaction explained roughly 5% of the variance in leisure writing, R^2 change for the interaction = .05, $F(1, 92) = 6.17$, $p = .015$. Sibling reading (block 3d) was not a significant moderator of leisure reading, $r = .48$, $R^2 = .23$, F change (2, 94) = .25, $p = .783$, or writing, $r = .41$, $R^2 = .17$, F change (2, 91) = .85, $p = .433$.

Discussion

In line with the validated curriculum hypothesis, we found that exposure to RB educational television was positively related to children's leisure reading and writing behavior at a crucial juncture in literacy development (i.e., forth–fifth grade).

Alternatively, exposure to NRB programs was negatively related to children's leisure reading. The negative relationship between NRB consumption and literacy behaviors was larger for children with increased overall time spent watching television (increased displacement) and limited parental reading behaviors at home (limited modeling). Our findings have several important implications.

First, not all educational shows were positively related to literacy outcomes. We postulated that RB educational shows would be positively related to literacy outcomes because they are designed around a curriculum to teach a specific academic or socio-emotional lesson. Consistent with this idea, the work of Linebarger and colleagues has shown that *Between the Lions* promotes basic literacy skills for early readers (e.g., Linebarger, 2000; Linebarger, Kosanic, Greenwood, & Doku, 2003), and several studies have been published that show *Reading Rainbow* is effective at promoting literacy development (e.g., Moses, 2011; Moses & Duke, 2008). On the other hand, *Boohbah* and *Teletubbies* may be labeled as educational—indeed, both of these programs are/were rated as E/I (“educational/informational”) on PBS—but they are not produced and created in the same way as RB educational programs. It is no surprise, then, that exposure to programs like *Teletubbies* and *Boohbah* was negatively related to leisure reading. Indeed, the results presented here are similar to Linebarger and Walker's (2005) study that found that exposure to *Teletubbies* was negatively related to children's learning outcomes. Thus, this study extends past work on television, literacy, and young children by providing data, in a comparative context, that is consistent with the notion that the type of educational television children watch matters.

An alternative explanation to these findings concerns the target age of the NRB programs. *Teletubbies* is a program made for infants, and although *Boohbah* claims to be a show for children older than three, many experts argue that this program is clearly targeting a younger demographic (Zurawick, 2004). Yet there is a lack of evidence supporting the educational or developmental benefits to media exposure for children less than two years of age (see Kirkorian et al., 2008). In fact, screen time in infancy is associated with expressive language delays (Zimmerman, Christakis, & Meltzoff, 2007). Accordingly, we could see a downward spiral develop: children who were encouraged to watch television at an early age are now watching more television in general, which displaces leisure literacy activities.

The results of this study lend some support to Anderson and colleagues' (2001) early learning model. This model would predict that effects observed here were due to the influence that RB educational programming had on children's pre-academic skills and level of motivation. If we assume that the children in this study who watched RB programs began school with the literacy skills necessary to do well, then this early exposure may explain, at least in part, the correlation between exposure and the types of activities in which children choose to engage—in this case, leisure reading and writing. In contrast, exposure to NRB programs may strain mental resources and hinder knowledge retention, a situation that may negatively predict children's leisure reading. Of course, we did not specifically measure such

depletion in this study. Future research should examine the effects of NRB programming on children's cognitive resources and its relationship to academic success.

RQ₅ and RQ₆ concerned family literacy habits and the relationship between early educational television exposure and children's leisure reading and writing. Here, it seems that parental literacy habits (and not siblings) moderated the hypothesized relationship. These findings bolster existing research that has found that parental influences are among the most important predictors of children's early literacy (Duursma, Augustyn, & Zuckerman, 2008). For example, the benefits ascribed to RB programming in this study could be a byproduct of parents—notably those who are active readers—recommending more educationally oriented programming to their children and/or modeling leisure reading behavior. A related variable that should be considered is parental mediation. Parental mediation is the extent to which parents actively mediate children's consumption of TV (Valkenberg, Krcmar, Peeters, & Marseille, 1999). The current study did not measure parental mediation, but given the importance of parent's reading behavior—and past research suggesting the value of parental mediation (Nathanson, 2001, 2015)—future research should examine whether parental mediation is a significant moderator of the patterns observed herein. The lack of a significant finding for siblings is harder to explain. One explanation for this null finding is that the majority of the children in this sample either did not have a sibling or had siblings younger than them. Unfortunately, we did not ask children or parents to report this information. Future research should continue to examine the role of the family in conjunction with media use to glean a clearer picture of children's enduring literacy habits.

Finally, this study also found that NRB educational television consumption was negatively related to leisure writing for children with non-reading parents. For these children, it appears as though they are receiving a double dose of messages discouraging leisure literacy behaviors; that is to say that children's early exposure to non-research based programs likely discouraged them from literacy activities, and they live in a home where literacy activities like reading are not modeled for them. These children are arguably the most disadvantaged. Future work should continue to study parental leisure habits in addition to television habits to examine whether these factors mutually influence one another over time.

Limitations and Future Directions

The current study was an examination of educational television viewing in early childhood and its relationship with current leisure literacy activities, as reported by children. Given the correlational nature of this project, we are unable to determine causality. It could be that children who already had an interest in leisure literacy activities at a young age were seeking out programs like *Reading Rainbow* because it was mutually reinforcing for them. Future work that employs an experimental approach is needed to untangle causality.

A second limitation is that the current study only examines four programs. Future research should examine whether the pattern observed here is replicated for a larger subset of children's programming. For example, researchers could examine children's consumption of all PBS, ABC, CBS, NBC, Disney, and Nick Jr. programs that bear the E/I label.

A third limitation concerns the use of children's retrospective reporting of their educational program exposure. Asking children—or anyone for that matter—to recall the frequency of their behavior 3–10 years prior to the survey is an endeavor fraught with error. The differences observed in the present study, for example, could reflect differences in recall for programs watched at a younger age (e.g., *Boobah*). There is evidence to indicate that normal memory, despite its flaws, is a reliable source of reports about the past. In their review, Brewin, Andrews, and Gottlieb (1993) found that, in general, recall of straightforward events with minimal subjective judgment represents sufficiently reliable information. Yet, a study based on children's recall of television programming is more accurately viewed as preparation for a larger research effort than a definitive statement in and of itself. Indeed, the ideal study would track children's consumption of various programs across time and examine whether that consumption was related to literacy skills and behaviors. A longitudinal study of this nature will require significant time and resources as well as a body of literature supporting the logic of the inquiry. The current study serves the latter goal. Barring that, researchers could also develop and validate retrospective measures for assessing past viewing behavior. If researchers could decipher the error rate of such measures, then it would be possible to model that error and perhaps enhance the accuracy of retrospective analyses.

Despite these limitations, the current study makes an important contribution to the literature. Consistent with the validated curriculum hypothesis, this study has shown early exposure to RB educational programs positively predicts children's literacy activities in later childhood. Our findings support existing research that has found RB programs to be the most successful at advancing children's literacy skills, underscoring the value of designing and testing educational TV content for children.

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