RELATIONSHIP BETWEEN FANTASTICAL EVENTS AND CHILDREN'S EXECUTIVE FUNCTION

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Abstract

The purpose of this study is to better understand the relationship between fantastical content in children's TV shows and executive function (EF). This project examined the research question: *Is there a relationship between the percent of fantastical shows selected and a child's EF?* Fantastical content is described as breaking naïve physics, impossible transformations (character's body changes shape, character spins and their clothes change, etc.), and fantastical beings (fairies, unicorns, etc.). Children aged 4- to 6-years and their parents/guardians were recruited for the study. Parents completed the demographic and EF section of the questionnaire by themselves. Following that section, they helped their child complete the fantastical section, comprised of forced-choice questions that required the child to choose between a fantastical show and a non-fantastical show. The percent of fantastical shows selected was calculated to gain an understanding of how many fantastical shows the child prefers to watch over non-fantastical shows. A Pearson correlation was computed to assess the relationship between the percent of fantastical shows selected and EF score. The findings suggest that there is no correlation between the percent of fantastical shows selected and EF score.

Relationship Between Fantastical Events and Children's Executive Function

Executive function (EF) is a collection of systems that work in synchrony with each other to carry out many different cognitive subprocesses that regulate the changing human cognition (Miyake et al., 2000). One subprocess, working memory, is the ability to store information in the brain and use that information to complete a task. Another important subprocess, inhibitory control, the restraint in completing an action or thinking of something one is not supposed to think about, and changing mind sets or adapting to the rules of a task when the situation changes (Lillard, Drell, et al., 2015). All the executive pathways are connected which makes it difficult to develop a singular theory. Therefore, research on cognitive psychology has focused on understanding and applying different theories and approaches to EF. It is important to understand the concepts and pathways for executive functioning because these processes have been linked to the prefrontal cortex of the brain, which regulates our actions (Miyake & Friedman, 2012). If something affects executive functioning, this could change the way a person thinks or behaves. There are many characteristics of EF that are seen during the first year of life, however, the most growth of a child's executive functioning happens during the preschool age (three to six years). During these years, children are able to wait longer for an object (inhibition) and are able to remember items for an extended period of time (working memory; Lillard, Li, et al., 2015). There are many factors that can affect EF, one of those being television. Prior research has mainly focused on pacing, educational content, fantastical events, among other factors of television (TV) a child is watching.

Effects of TV Content on Executive Function

Attentional processing demands a certain amount of mental resources, and when an event is novel, the demand for mental resources is even greater. When most of the resources are spent

grabbing attention, fewer resources are available to process what the event is trying to convey. This means a child's cognitive pathways are allocating more resources to processing the novel event rather than allocating resources to taking in all the information in the event. A schema is a pathway of neurons that are grouped together with related concepts. Schemas make it easier to "look up" something in the brain. New links are made between schemes and act as short cuts for the brain. This makes it more efficient for the brain to relay a behavior to respond to the event (Mu, 2021). Familiar events or objects can be added to the child's existing cognitive schemas, but novel events require accommodation of these existing pathways to fit the new event or object which is why these occurrences use more resources to process than assimilation (Rhodes et al., 2019). For example, in the well-known TV show The Road Runner Show, Wile E. Coyote and Road Runner play many pranks on each other. These pranks lead to fantastical events. Wile E. Coyote often is seen hovering in the air for longer than is possible. This breaks naïve physics, the basic level of physics knowledge people understand. If a child has never seen this event before, they dedicate more resources to trying to understand how to categorize that event into existing schemas based on previous encounters, rather than understanding the smaller details of the show: the environment and the message of the show.

Previous studies have focused on the impact TV (e.g., educational content, pacing, fantastical events) has on preschool-aged children's EF. One study focused on content, educational versus non-educational, that was delivered through a touch screen device or a TV, respectively (Huber et al., 2018). They found that children who played the educational app were more likely to delay gratification than children that watched a cartoon. Children who played the educational app also showed improved working memory. This research suggests that educational content has on a positive effect on children's EF.

Another factor that affects EF is TV content pacing. Pacing is defined by how fast the scenes changed within a given clip. Lillard and Peterson (2011) specifically looked at the Head-Toes-Knees-Shoulders, backward digit, Tower of Hanoi, and delay of gratification tasks. They found that watching a 9-minute clip from the fast-paced TV show SpongeBob was enough to negatively impact a child's executive functioning on all tasks when compared to the control group where the children drew for 9 minutes. Fast-paced scenes cause high levels of stimulations that take away from attentional processing of the TV show which can be detrimental (Lillard, Li, & Boguszewski, 2015). Geist and Gibson (2000) found that children who watched thirty minutes of Mighty Morphin' Power Rangers (a fast-paced, fantastical show) switched tasks more often and spent less time on a specific task than the children that watched Mr. Rogers' Neighborhood or the control group that did not watch any TV at all. This explains how fast paced shows negatively affect a child's ability to maintain attention, a key part of EF. In addition to investigating the influence of pacing on EF, this study highlights the need to explore the impact of fantastical content within children's TV on the child's executive functioning.

Fantastical Content

Fantastical events are physically impossible (a character changing shape to fit through an object or a train bouncing on railroad tracks), break the laws of physics (Coyote hovering in the air before falling), and/or include fantastical beings (a fairy or unicorn; Jiang, et al., 2019; Lillard, Li, et al., 2015; Lillard, Drell, et al, 2015). Fantastical events use many mental resources, therefore, children have more difficulty processing them. If there are many fantastical events, the children are constantly re-orientating themselves without taking in information (Taggart et al., 2019). Simply put, fantastical events are novel and take extra cognitive resources to assimilate these events into current schemes. Rhodes et al. (2019) looked specifically at fantastical content

of the show and whether fantastical content disrupted EF processes (inhibition, working memory, cognitive flexibility, and planning). After the children were assigned to a group, they completed a pre-test of EF tasks. They watched 23-minutes of a cartoon, either Little Einsteins (fantastical) or Little Bill (non-fantastical), then completed a battery of post-test EF tasks. Rhodes et al. (2019) found that children in the fantastical condition performed worse on inhibition, working memory, and cognitive flexibility than children in the non-fantastical condition. These findings suggest that the negative impact fantastical content carries through early primary school year.

Jiang et al. (2019) studied whether there was a threshold of fantastical events per show to have an effect on the child's EF, or if it did not matter how many events were contained within the show. They used a fantastical Chinese cartoon called the Pleasant Goat and the Big Bad Wolf. Three episodes were shown that varied in fantastical content based on the number of fantastical events in a 12-minute cartoon: high-fantasy (31 fantastical events per episode), mid-fantasy (17 fantastical events per episode), and low-fantasy (4 fantastical events per episode). They found that children who watched the low-fantasy episode performed the best inhibition control and cognitive flexibility. However, instead of the expected result of the high-fantasy group performing the worst, it was actually the mid-fantasy group that performed the worst. The authors attributed this discrepancy to the high-fantasy cartoon having fantastical events that surpassed the children's processing load and therefore the children missed many of the events. While the event was novel, the children may have shifted their attention to something they could process and became less engaged in the show.

Interestingly, one study by Lillard, Li, et al. (2015) investigated the potential influence of educational content on the relationship between fantastical content and EF. Educational content alone, has a positive effect on children's executive functioning (Huber et al., 2018). Lillard, Li,

et al., (2015) explored the possibility that fantastical content may interact with educational content. For the educational show, they used the fast-paced, fantastical show, Martha Speaks, because it is intended to teach children vocabulary. The non-educational show was SpongeBob. Overall, fantastical content significantly impaired executive functioning, even if the show was educational. Lillard, Li, et al. (2015) examined this by measuring if the child learned the vocabulary words presented in the show Martha Speaks. The results suggest that even in 2-12-minute episodes, children cannot process all of the information. This work demonstrates that even if the show is intended to teach the child, they cannot grasp the concepts (vocabulary words) they are meant to learn because they are busy processing the novel fantastical events.

Another study investigated the impact of viewing versus interacting with fantastical content. Li, Subrahmanyam, et al. (2017) found that children's inhibitory control was negatively impacted when they viewed the fantastical cartoon but not when they interacted with the fantastical game. They believe that this is because children interacting with the fantastical content might have perceptions that the fantastical content is more realistic. Using a functional near-infrared spectroscopy (fNIRS), they also found that the left dorsolateral prefrontal cortex was more active in children who watched the fantastical compared to the non-fantastical cartoon. The left dorsolateral prefrontal cortex is activated when nonverbal working memory, task switching, and behavior inhibition are exhibited (Mueller et al. 2013). This can explain why the children who watched the fantastical cartoon struggled with the inhibition. The viewing of the fantastical events consumed a larger amount of cognitive resources, which can be due to the children's brains trying to fit the fantastical events into an existing schema. Once the cognitive resources are taxed, they had fewer mental resources available for the inhibition task than the children who engaged with the fantastical videogame.

Current Study

While there is research on the effect fantastical content has on children's EF, there is much to be learned. Most of the previous research looked at the immediate effect of fantastical content by having the children watch a clip or episode of a show during the study (Jiang et al. 2019; Li, Subrahmanyam, et al., 2017; Lillard, Li, et al., 2015; Rhodes et al. 2019). Further research is necessary to understand the prolonged relationship between fantastical content and EF. The current study investigated if shows watched in the past continued to affect EF comparable to the studies that looked at the immediate effects of fantastical TV shows. The relationship will be based on the numerous shows a child has watched and their preference on fantastical or non-fantastical shows.

Preliminary Study

The aim of the preliminary study was to determine the most popular shows of children aged four to six years old. Through previous work, the ECU Infant and Child Cognition lab has identified the most popular TV shows for children; however, it is understood that the children's TV market is dynamic with new shows being created and old shows becoming irrelevant. The top three to five shows that were previously collected may not be the top shows now. These shows children prefer to watch are important to the investigation as they will provide evidence to what shows are currently popular on average. The shows that were collected were sorted into fantastical and non-fantastical categories and compared with the previous work. Once it was identified that the children's TV market had not changed, the 40 most popular shows (20 fantastical and 20 non-fantastical) from the previous work were used as stimuli in the main study.

Methods

Participants

Participants included 20 children between the ages of four and six (M = 4.79 years, SD = 0.893 years). All families were recruited from the social media platform, Facebook. A post on East Carolina's Infant and Child Cognition Lab was made and shared by Facebook users.

Design

Ethical approval was obtained from the Institutional Review Board (IRB) at East Carolina University through the Harriot College of Arts and Sciences in the department of Psychology.

Procedure

Parents who consented to the study and children who assented to the study completed a questionnaire about the child's favorite shows. The questionnaire asked the child's age and birthdate. It also included the following question: *What are the top 3-5 shows your child watches?* It took around five minutes to complete.

Results and Discussion

Of the 20 participants who started the questionnaire, 6 were excluded (n = 1 did not consent to study, n = 5 opened the study but failed to finish). Of the remaining 14 participants, 53 shows were collected. They are summarized in Table 1. Only 16 new shows were recorded out of 53 (30.19%). Thirty-seven of 53 shows were repeated from the old pilot data (69.81%).

Table 1. Favorite TV Shows.

Favorite TV Shows	
New Shows	
Ryan's World	Santiago of the Seas
Dino Dan	Bluey
Stinky and Dirty	Rescue Riders
Super Truck	Bunk'd
Scooby Doo and Guess Who (2)	Kids tube (2)

Just Add Magic	Sherriff Callie
Mandalorian	Kung Fu Panda
Elena of Avalor	Jake and the Neverland Pirates

Repeated Shows

Blaze and the Monster Machines (4)	Blue's Clues
Paw Patrol (6)	PJ Masks (3)
Wild Kratts (3)	Power Rangers
Story Bots	Pokémon
Shimmer and Shine	Tumble Leaf
Animal Documentaries	Team Umizumi
My Little Pony	Sofia the First
Peppa Pig	Disney Movies
Blippi (2)	T.O.T.S.
Arthur	Mickey Mouse Clubhouse
Daniel Tiger	LEGO Movies

The purpose of the preliminary study was to identify the most popular children's shows so these shows could be used as stimuli in the main study. Results of the pilot study were consistent with and support the previous data – 69.81% of the participants' favorite shows were the same. Because the novel shows were not repeated more than 4 times, these novel shows were not included in the main study, as they did not surpass any of the popular show response number. Some of these repeated shows were incorporated into the main study's questionnaire. The source for the main study's stimuli was from the previous work done in East Carolina's Infant and Child Cognition Lab. The top 20 fantastical and 20 non-fantastical shows were chosen from this data and, therefore, only some of the preliminary shows were incorporated into the study.

Main study

The present research investigated the correlation between fantastical TV shows and children's EF. This study looked at the prolonged relationship these shows have on the EF of the

children. In previous research findings, fantastical events have a negative effect on EF, therefore, it is hypothesized that the more fantastical shows a child watches, in comparison to non-fantastical shows, the lower the EF score will be. Fantastical shows contain events that are novel and do not assimilate into the current schemes. Therefore, accommodation needs to occur, and this exhausts more mental resources causing the information in the TV show to be lost.

Methods

Participants

All families were recruited from the social media platform, Facebook. A post on East Carolina's Infant and Child Cognition Lab was made and shared by Facebook users. A paid Facebook advertisement was also published and ran for five days. Recruitment began February 25, 2021 and was completed March 25, 2021. Participants were families with a child between the ages of four and six. They were healthy and of typical development.

A total of 106 families were recruited for participation in the study. Of the total sample, data from 70 families were retained for analyses. Any parent who reported their child having a diagnosis (e.g., ADD/ADHD) was excluded (n = 10). Participants were also excluded from the study due to failure to finish the survey (n = 26).

The final sample (n = 70) was 55.7% female, aged 4 to 6 years (M = 5.36 years, SD = 0.81 years). See tables 2 and 3 for child and family demographics.

Table 2. Child demographics.

Child Demographics	
Grade in school, %	
Pre-K	21.4
Kindergarten	70
1st grade	7.1
2nd grade	1.4
School type, %	

In person	71.8
Virtual	14.3
Hybrid	12.9
TV time, %	
Weekly	
0-5 hours	71.4
6-10 hours	20
11-15 hours	4.3
16-20 hours	2.9
21-25 hours	0
25+ hours	1.4

Table 3. Parent/Guardian Demographics

Parent/Guardian Demographics	
Highest Education Received, %	
Some Highschool	2.9
Highschool Diploma/GED	10
Some College	57.1
Associates	1.4
Bachelor's	25.7
Doctorate	2.9
TV time, %	
Weekdays	
0-5 hours	25.7
6-10 hours	22.9
11-15 hours	38.6
16-20 hours	8.6
21-25 hours	2.9
25+ hours	1.4
Weekends	
0-5 hours	65.7
6-10 hours	22.9
11-15 hours	5.7
16-20 hours	4.3
21-25 hours	1.4
25+ hours	0

Design

Ethical approval was obtained from the Institutional Review Board (IRB) at East Carolina University through the Harriot College of Arts and Sciences in the department of Psychology. This is a correlational study between percent of fantastical content and EF score.

Procedure

Parents who consented to the study and children who assented to the study completed a questionnaire through Qualtrics. First, parents were asked to read a paragraph explaining the research to the child. If the child agreed to participate, the yes box was checked. It took an average of 45 minutes to complete. The ordering of the questionnaire was as follows: demographics, REEF questionnaire, fantastical content.

Measures

Demographics. The demographic section was composed of 13 questions and was completed by the parent or guardian. The questionnaire was administered through Qualtrics. Demographic data was collected on the child's age, birthday, gender, grade in school, school method of delivery, diagnosed mental conditions, time spent watching TV during the week and on the weekends. Demographic data was also collected on the parents' highest education received and time spent watching TV during the week and on the weekends.

Executive function. The EF section of the questionnaire was completed by the parent or guardian. It was comprised of 76 questions that gauged the EF of the child asked the parent or guardian if they guessed when answering the question. The Ratings of Everyday Executive Function (REEF) is a questionnaire that measures EF without any in-person tests. The advantage of measuring EF this way is that it gives a more natural measurement of everyday EF by including information from the child's home, school, and/or daycare (Nilsen et al., 2017). The questionnaire contains 76 statements of actions that a child with a well-developed EF would

exhibit. For example, *Persists at games or puzzles even when he/she finds them frustrating*. The parent had the option of choosing between "is not able" (0), "never or almost never" (1), "sometimes" (2), or "always or almost always" (3). Nilsen, et al. (2017) conducted four studies, each refining the REEF's content, until the 76 statements remained. The final version of the REEF had an internal consistency of $\alpha = .97$ (Nilsen et al., 2017). All the studies found that the REEF has a significant correlation with the BRIEF-P and EF composite tasks.

Fantastical Content. A forced choice section between fantastical and non-fantastical shows was used to determine how many fantastical shows a child preferred to watch. The child was shown pictures of characters from the selected shows and asked which show they would prefer to watch. The shows were paired up with a fantastical and non-fantastical option for a total of 20 pairs. Shows were randomly assigned a pair and randomly arranged in the questionnaire. The pictures showed the full body of the main characters. A list of the shows used in this study is presented in Table 4. An example of how these questions were set up are as follows: *Which show do you prefer to watch?* The options included: *Show 1 (including a picture of main characters) or show 2 (including a picture of main characters).* No titles or character names of the show were used in the answer choices. Following the forced-choice question, the parent was asked if their child had watched both the fantastical show and the non-fantastical show, only the fantastical, only the non-fantastical, or neither. This was important to collect because if the child has watched neither of the shows, then their choice of show was just based off the content in the picture. In the following section, the parent asked the child if they were familiar with popular shows. The child was shown five fantastical shows and five non-fantastical shows that were most popular. If the child said yes, they were asked to name the show title or main character to check their knowledge. This was important to the investigation because if the child was familiar with

many of the top shows (fantastical and/or non-fantastical) it would help classify the child as more of a fantastical or non-fantastical watcher. If the child was more familiar and able to name more of the fantastical shows they were classified as a fantastical watcher and if they were able to name more of the non-fantastical shows they were classified as a non-fantastical watcher. This section also contained one question about what the child prefers in the shows they watch. The question was as follows: *What do you like in your shows? (e.g., superheroes, magic, cars)*. This was used to gain an understanding of the type of shows the child watches, fantastical or non-fantastical. This would also add to the overall classification of the child as more of a fantastical or non-fantastical watcher.

Fantastical content in this study was described as breaking naïve physics, impossible transformations (character's body changes shape, character spins and their clothes change, etc.), and fantastical beings (fairies, unicorns, etc.; Jiang et al., 2019; Lillard, Drell, et al., 2015; Lillard, Li, et al., 2015). This study excluded the characteristic of anthropomorphism as a criteria for fantastical content due to the large number of children's shows including characters in a non-fantastical environment (e.g. Arthur, Peppa Pig, etc.). It was decided that if the shows environment was non-fantastical as well as not incorporating any fantastical events, the anthropomorphic characteristic was not critical in labeling the show fantastical. The shows that were collected in the preliminary study did not have to contain all the criteria mentioned (breaking naïve physics, impossible transformations, and fantastical beings), only one of the characteristics in the show had to be present to be considered fantastical. The coding procedure to determine whether a show would be classified as fantastical or non-fantastical was to watch season 1 episode 1 of all the shows, if it could be found for free (80%). If not, five clips on YouTube were watched and if three out of the five clips had at least one fantastical event, the

show was categorized as fantastical. Previous work by Rhodes et al., (2019) classified SpongeBob, Power Rangers, Paw Patrol, Phineas and Ferb, Kim Possible, and Ben 10 as fantastical. They also classified Peppa Pig, Arthur, Horrid Henry, Fireman Sam, and Postman Pat as non-fantastical. When coding the shows for this study, these shows were categorized in the same way. Paw Patrol originally had the highest response rate, 11.33%. Peppa Pig was the next highest with 5.78%. Paw Patrol was excluded from the fantastical grouping of shows due to the large gap between Paw Patrol and Peppa Pig. This decision was made because children may be more likely to choose Paw Patrol based on familiarity rather than actually enjoy watching the show.

Table 4 Fantastical and Non-fantastical Shows.

Fantastical and Non-fantastical Shows	
Fantastical	Non-fantastical
PJ Mask	Peppa Pig
Daniel Tiger's Neighborhood	Fancy Nancy
Mickey Mouse Clubhouse	Blippi
Barbie: Life in the Dreamhouse	Spirit Riding Free
Puppy Dog Pals	Llama llama
Wild Kratts	Clifford
Blaze and the Monster Machines	Dinosaur Train
Vampirina	American Ninja Warriors
Butterbean Café	Arthur
Boss Baby	Chip and Potato
SpongeBob	Octonauts
Magic School Bus	Pete the Cat
Masha and Bear	Pinkalicious
My Little Pony	Sesame Street
Pokémon	Sid the Science Kid
Story Bots	British Baking
Doc McStuffins	Curious George
Miraculous: Tales of Ladybug and Cat Noir	Fresh Beat Band
Power Rangers	Fuller House
Sofia The First	If I Were An Animal

Results

It was hypothesized that the percent of fantastical shows children selected during the fantastical content section of the questionnaire would be negatively associated with their EF score from the REEF questionnaire. A Pearson correlation coefficient was calculated during the analysis of the data. Four data points were removed because they were further than two standard deviations from the mean EF score (M = 127, SD = 28.76). The analysis was run after these outliers were removed. The analysis suggested that percent of fantastical shows chosen is not related to EF score, r (66) = 0.151, p = 0.226 (Figure1). Most, if not all, of the participants had selected having only seen one show and/or neither for at least one question. This could mean the show they chose was based on familiarity. On the familiarity questions, the results were inconclusive. The majority of the answers for the name of the show/main character were either wrong or left blank (81.57%). Only 18.43% had said they were familiar with the show and had the correct character or title. There were very few participants who had the correct answer. Therefore, analysis of this section was omitted. The open-response question asking the child what they prefer in a show were analyzed and placed into either a fantastical (n = 38) or non-fantastical (n = 19) category (Table 4). Seventeen participants were excluded because they did not answer the question correctly (n = 11) and they were not specific enough (n = 6).

Figure 1 Fantastical Shows Selected versus Executive Function Scores.

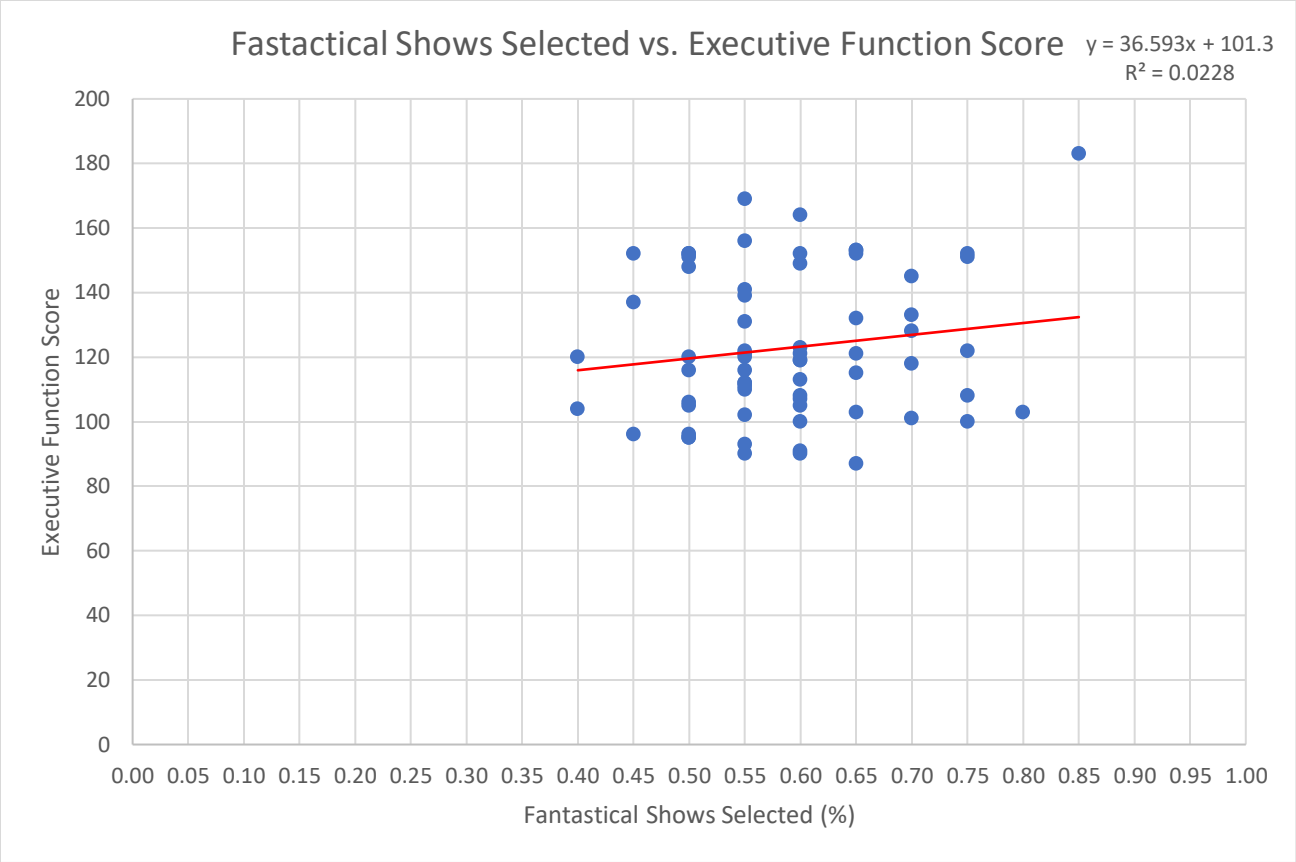

Table 4 Preference of Show Content.

Preference of Show Content	
Fantastical	Non-fantastical
Monsters	Animals
Superheros (12)	Cars (5)
Magic (13)	Conversation
Superman (3)	Automobile (2)
Spiderman (5)	Racing (3)
Iron Man	Hippo
Batman (3)	Puppies
	Science (3)
	Reasoning (2)

General Discussion

The preliminary study investigated the top shows in the children's TV market. This was achieved through a questionnaire to identify popular children's shows. The results of the

preliminary study were consistent with data collected in previous Infant and Child Cognition Lab studies. After the top 20 popular shows from each category, fantastical and non-fantastical, were established, they were used in the design of the main study questionnaire. The main study investigated the effects fantastical content has on children's EF. It was hypothesized that children who watch more fantastical shows would have a lower EF score. The results were not statistically significant. There was no correlation between the percentage of fantastical shows selected and the corresponding EF score.

Schemas

Schemas have an important place in this research because they explain why processing fantastical events consume so many cognitive resources. Schemas are comparable to categories in our brain and incorporate familiar events and objects. Schemas link related events and objects together so when the brain activates certain neurons, there are "short cuts" to get to the desired thought or behavior (Mu, 2021). Fantastical events do not fall into a schema. They are novel events which require accommodation. Accommodation demands more cognitive resources to find which schema the fantastical event would fall into, therefore, limiting the information taken in from the TV show (Rhodes et al., 2019).

Fantastical content

Rhodes et al. (2019) found that when children watch a 23-minute fantastical cartoon, their EF processes are impaired. They specifically looked at inhibition, working memory, cognitive flexibility, and planning. This study did not find similar results. Other studies investigated if the effects of fantastical events can be diminished by educational content (Lillard, Li, et al., 2015) or interaction with the content (Li, Subrahmanyam, et al., 2017). Lillard, Li, et al. (2015) found that even though the show was classified as educational, if it contained

fantastical events the child's EF was still impaired. Li, Subrahmanyam, et al. (2017) found that children's EF is only impaired when watching fantastical events and not when interacting with fantastical events. The educational content was not analyzed for each show. It may be interesting to see if the shows that would be classified as educational and fantastical replicated the results Lillard, Li, et al. (2015) found.

One explanation for the results of the main study is the number of fantastical events per episode. Jiang, et al (2019) found that children who watched the low-fantasy episode (four fantastical events per episode) performed the best in the inhibition and the cognitive flexibility tasks and children in the mid-fantasy group (17 fantastical events per episode) performed the worst at the same tasks. They hypothesized that the high-fantasy group would perform the worst and attributed this difference to the excessive number of fantastical events included in the study episode. The sheer number of fantastical episodes may have surpassed the children's processing load causing the child to miss many of the following events, including fantastical ones. This suggests that there is a maximum limit of fantastical content that could affect the child's EF. This study, however, did not look into the number of fantastical events per episode; therefore, the shows were not categorized into low- mid- or high-fantasy. The shows selected for this study may have all been a part of the high-fantasy group which is why there was no correlation found during the analysis.

Limitations

This study included potential limitations. The major limitation was the inability to conduct EF tasks in person. The data collection process took place during the COVID-19 pandemic and many educational facilities, including East Carolina University, were closed and not allowing visitors. In order to collect data, the REEF was used in place of in-person tasks.

While the REEF is a validated measure, there is always bias involved in a questionnaire. The average percentage of guesses on the REEF questions was 77.02%. Another limitation was the sample size. While 106 families did participate, only 66 were used in the analysis. A larger sample size may have brought a significant correlation. The study would have benefited more if only the participants that had watched both shows were included in the study. This would mean that the children were familiar with both shows and could have selected the show they liked better with more confidence. If the participants were excluded for having seen show 1, show 2, or neither, there would not be enough data for a meaningful analysis. If the study were to be conducted again, in-person EF tests would be beneficial as well as a larger sample size.

Conclusion

This study investigated the effects fantastical content has on children's EF. This study contributes to existing research because there are very few studies that focus on fantastical events alone. Also, most studies look at the immediate impact of fantastical events by having the child watch a clip, then carry out EF tasks. Due to the inability to perform in person testing, this study focused more on prolonged relationship fantastical shows have on children's EF. This study looked at the TV shows children would prefer to watch and shows they selected, then coded the percent of fantastical shows they selected. The results were not consistent with previous research. No correlation was found between fantastical content and EF.

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