Negative Effects of Child and Adolescent Use of the Internet and Mobile Devices

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Introduction:

The majority of children today have some kind of electronic device like a tablet or a smart phone. They spend lots of time on these devices doing a variety of things. Some watch videos online, some talk with friends, some play games online with strangers. There is an endless world for them to discover online and they have everything at their fingertips (Provided their parents have not put some kind of parental control on the device). Ideally these children would learn about things that they are curious about and interact constructively with each other for mutual benefit. But that's not the case because they are children, and they do not have adult maturity. It is easy for adults to imagine that they will make the right choices but sometimes it's hard to put yourself in the mind of a child that can do whatever they want on the internet and these devices. In reality, children often access content that is harmful to their mental and cognitive development and interact negatively with their peers (Mthethwa, 2014). The content that children tend to gravitate towards is described by the term "brainrot". The actors in this socio-technical problem are the children that are using the devices, the parents who are enabling their children to have this kind of access and the people creating this content on the internet, intending for it to be consumed by children. The actors in this network all have to behave a certain way in order for children to end up watching hours and hours of this content per day. All the actors have their influences and their reasons for acting the way that they do.

This research aims to discover the effect that all of this has on children's and adolescents' cognitive ability, social skills, and mental health. There is no doubt that all of this will affect it in some way. There has been no generation ever that has been raised this way. People worried about children watching too much television back in the 1950's but this is a whole other animal (Maccoby, 1951). The worry about television initially does point out something to consider: the

older generations will always worry about the newer generations having access to a technology or lifestyle that was not prevalent in the previous generation. Some would say that the drastic worry about children's screen habits today is just another overreaction and that everything will be fine once they grow up and grow out of it. I believe that this is not the case this time. I believe that the amount of screen time and the content that these children are consuming is having a negative effect on their cognitive abilities and mental health.

Background:

There is no doubt that children today consume more content from tablets and smart phones than previous generations. This has sparked the creation and use of the term "IPad Kid". It is usually a negative term that refers to a child that has poor social and cognitive skills for their age and one that cannot behave, often resorting to fits and crying to achieve their goals. Not every child today would be called an "iPad Kid" but there is certainly a trend. Just go to any airport or kid-friendly restaurant and you will observe a decent number of children with their face buried in some sort of tablet or smart phone. These are often given to the children by a parent or guardian who wants peace and quiet and to not have to entertain the children for that period of time (Kroshus et al., 2022). Most parents will do this on flights or at restaurants. It does seem like a lot of children today go further than this and constantly use and need devices in normal settings. An important term in all of this is attention span. This refers to the length of time a person can focus on something before they start to get bored or tune it out. While this metric is hard to measure and quantify, a child lacking it can be obvious (Silverman & Gaines, 1996). Elementary school teachers are complaining more and more about kids they call "roamers". They will just get up from their seat in class and leave because they cannot pay attention for the required amount of time. The initial worry of children watching too much television in the 1950s

did not involve attention span (Maccoby, 1951). Back then there were only a handful of channels to choose from. Even if a child watched TV all day, they were forced to watch one thing. This would not have damaged their attention span. Children with tablets and devices today can choose an essentially infinite number of things to watch across many platforms. This is the main aspect that enables the degradation of attention span. If a child gets bored after ten seconds of watching something and they want to change it, there is nothing stopping them. Repeating and repeating this process day after day certainly will affect their attention span whether it is quantizable or not.

This is the concern for young children with unfettered access to tablets and smart phones but what about the older children? They tend to use social media more than to watch "brainrot" content. This term is used to describe content that has no mental or cognitive value, whose sole purpose is to allow the viewer to drift away and turn their brain off. Social media can make it easy for them to connect with their friends and share ideas online with like-minded people from across the globe, but it can also have a dark side. Social media has been shown to be very addictive, especially to adolescent-aged minds. Checking people's profiles and looking at pictures of events can be huge dopamine hits for these teens. It's not just addictive; it can harm their mental well-being as well. Cybering bullying has been a growing thing starting in the early 2000's. These teens can receive many unwanted, hateful messages that can distort their self-image and make them depressed. Constant contact online can also make it harder to communicate and connect with people in the real world. This can be deteriorating to their bonds with real friends and their families. The internet and social media also have a ridiculous ability to radicalize impressionable people, especially teens (Yusuf et al., 2020).

All of this is concerning but the real reason this needs to be analyzed and talked about is the fact that this is only the tip of the iceberg. This level of content consumption and social media use has only existed for the past five or ten years (Chang et al., 2018). The infants today that are already hooked on this level of screen-dependency have not had the chance to grow up and show the long-term effects. This generation of children will run the world one day and the direction that that world could go depends on them being able to function at the right cognitive level and the ability for them to communicate with each other in a meaningful way. This could all be an overreaction or it could be the next cigarette: something that was taken for granted and common place that turned out to be very detrimental once the long term effects reared their ugly head. The problem with "IPad kids" is that when we get to the point where we can see the long-term effects with our own eyes it will be too late, they will have all grown up and oversee the world. That is very this needs to be investigated and why this kind of research matters.

Methodology:

The STS theories that will be used to analyze this complicated issue will be Responsible Research and Innovation (RRI) as well as Actor Network Theory (ANT). RRI emphasizes the unintended consequences of an invention of technology and how engineers are responsible for designing solutions and addressing them when they present themselves. It is a great way to rationalize the rise of these devices and the rise of social media and the internet. The internet and social media were first created with the idea of benefiting all mankind by making it easier then every to connect with people all over the world and share ideas and viewpoints. Social media was engineered to make it easier to keep up with acquaintances over greater distance to bring people together. While these two technologies have done that, they have also introduced a whole host of new issues that certainly need to be addressed as well. That is the method that will be

used to look at all the nuances of the internet and social media to determine why they are the way that they are.

Actor network theory works well to explain how society has changed given the introduction of these devices. The effects can be seen in the daily activities of children. They have ushered in the whole idea of "screen-time". They have been extremely influential in other ways as well. For example, many restaurants do not have paper menus anymore, they use QR codes and menus online because pretty much everyone has a smartphone. The smartphone forced that change. There is no debating that the internet, social media, tablets and smartphones have become ubiquitous in today's society. Stronger forces made that happen and the best approach to dissecting these forces is a combination of RRI and ANT. ANT first to explain the spread and RRI second to explain the negative side effects of the massive spread. Resources describing the current percentage of children that use and own these devices will be found to show the current state of the spread. Articles discussing the negative side effects will be found to address the RRI portion of the problem.

Literature Review/Discussion and Results

Children's use of mobile devices and the internet will be investigated through research and other sources, this will be split from the investigation of adolescent's use of mobile devices, and the internet. While these two groups are both negatively affected by the use of mobile devices and the internet, they need to be differentiated because the harm occurs in different ways.

The access and constant use of an iPad among young children negatively affects their attention span more than television (Espiritu, 2016). The information presented and collected supports the hypothesis that increased screen time for children is negatively affecting their

attention span. Data was collected and it showed that iPad use with many exogenous stimuli (The children don't simply watch a video, they constantly control what they are watching) created the worst attention span. This is because children are not forced to finish what they are watching as would be the case with television. They watch shortly and shorter videos to feed their degrading attention spans. They can simply switch to something else when they become bored. The study was able to pick up on this trend way back in 2015, showing that this is not a new issue, and it won't go away.

The focus on attention span is a difficult one as it is not a concrete quantitative value but a qualitative one that is difficult to measure accurately across different children. This can be seen in an article about exactly that, measuring attention span. An article from the Journal of Genetic Psychology (Silverman & Gaines, 1996) goes into detail about different attention span tests for toddlers aged 23-25 months. The study used standard situations to measure the attention span of the children individually and highlight differences between children. A vigilance task was used to measure attention span, and problem-solving tasks were used to measure persistence. The conclusion and argument of the article was that creating situations to accurately measure the attention span of children is difficult and varies between children. This is unfortunate because attention span is a big part of children's mental health and is what allows them to excel in school and their career and that could become compromised without an exact way of detecting deficiencies in this critical area.

A study was conducted on the experience of a 28-month-old child using an iPad (Zhukova et al., 2020). The study argues that this kind of interaction needs to be further studied today as it is becoming more and more ubiquitous. The study comments on the fact that these interactions are often unseen by parents because they give the child the iPad to occupy them while they do

something else. The study combined qualitive factors of the child's interaction along with quantitative metrics to gauge the attentiveness of the child during the sessions as well as the improvement to color and symbol recognition. The study showed that the child became bored at times with the iPad. The argument of the article is that the iPad can be beneficial for the child if the activity is supervised by a parent or guardian, but it comes with a cost of the child being bored. A secondary argument could be concluded from the article that educational content tended to make the child bored which suggests that a lot of iPad addicted children today are not using iPads for educational purposes. The only thing that stopped the children from switching to something they did not find boring was the presence of their parents. The majority parents who let their children use iPads and other devices for long extended periods of time are doing it to distract their children so that the parents can get things done, they are not policing it every second. This trend increased greatly during and after the COVID-19 pandemic.

An article from the American Academy of Pediatrics (Kroshus et al., 2022) goes into greater detail about the use of screen time among children during the COVID-19 pandemic. The article concluded that parents working full time had children that developed worse screen-time dependencies and behavior. The argument of the study was that there were certain demographics and situations that affected a child's development of an unhealthy dependency on screen-time. A secondary argument could be made from the results that this points again to the fact that parents need to monitor the screen time of their children. This is because the children who developed the worst habits did not have parents at home. This article is reinforced by the study of the 28-month-old and the iPad (Zhukova et al., 2020) which found children grew bored and restless with good educational content. If the children are left to their own choices, they will not pick the beneficial content.

An article from the Psychiatry Investigation journal (Chang et al. 2018) focuses on a sample of children 2-5 years old in Korea and tracks how much time they spend watching TV or using a smartphone during weekdays and weekends. While the study shows that the majority of children watched television, the next two largest groups were laptop/PC and smartphones, both of which have access to the internet. This study was also completed in 2018 so the number of children using PCs and smartphones has likely increased. The argument of this article was to highlight how much children spend on devices and the internet and draw attention to the fact that more research needs to be completed in this area. There is a real concern about the nature of children and devices. This article and Espiritu's thesis (Espiritu, 2016) show that there is general concern about the lack of information and concrete ideas of the effects these interactions will have.

Countries and government bodies are taking notice of the harm the internet is doing to young children and creating laws and policies to fight the dangers. An article from the University of Witwatersrand in Johannesburg (Mthethwa, 2014) focuses on policy and regulations of content on the internet that are aimed to protect children from harmful material, implement in South Africa. It acknowledges the good that the internet has done but focuses on keeping children safe from harmful content that they could stumble upon when on the internet. Unfortunately, finding all harmful content and deleting it is impossible because of the sheer quantity of it. This necessitates the policing of the children using the internet by parents or guardians which unfortunately is not possible for every family or child. The argument that is made is that the current regulation needs to be updated for a changing internet to continue to be effective. Some old policies do not apply or work anymore with the growth and the changing nature of the internet.

The issues that arise with the constant use of the internet amongst adolescents stem from social media rather than content that degrades the attention span, but attention span is still a part of it. They often become addicted to the internet because they rely heavily on the dopamine hits that the internet provides.

An article explaining the IAT (Internet Addiction Test) written by Dr. Kimberly S. young, a licensed psychologist and international expert on Internet addiction who developed the IAT (Young, 2017). The test is widely used in studies on internet addition to classify the amount that someone is addicted to the internet. The test was developed in 1998 due to the fact that internet addiction needed to be addressed that early in the existence of the internet. The test consists of eight questions that gauge a user's dependency on the internet. The number of questions the subject identifies with correlates to their addiction level to the internet. The primary argument of the article is that the way internet addiction is gauged needs to be standardized to produce better results that can be shared across studies. The questions focus on the need of the user to spend more time on the internet each time, how much they think about the internet when they are not on it, and other similar factors. This was already a problem soon after the adoption of the internet by the general public. In the past 25 years it has only gotten worse. Updated research is needed as this test likely has not aged well and needs to be updated the reflect the current trends of internet addiction. This test is difficult as well because it relies on the honesty of the person filling out the question. Adolescents today could lie to hide their true addiction for fear of being judged or admitting their addiction to themselves.

A study published in Adolesc Med Health (Yusuf et al., 2020) explores how internet addiction affects the health of adolescent interactions with varies entities such as parents, school, and the community. The results of the study and the conclusion argue that internet addiction does

not affect the adolescent's interactions with the community but does affect interactions with parents, peers and school. The study used the IAT (Internet Addiction Test) to classify the teens that participated in the study into different levels of internet addiction. The study highlights how the accessibility of the internet degrades normal social interactions, such as children playing video games or watching videos instead of spending time with their family or playing with their friends during recess breaks at school. A secondary argument from the source is that the internet sometimes has an opposite effect than intended. It was supposed to bring us together as a society and it has but at the expense of local social interactions.

The negative effects of adolescents using social media do not end with impaired social interactions. The key argument in the article from the IJHSSS (Shukla & Kirmani, M.N.) is that internet addiction in adolescents today has a negative effect on their productivity and ability to perform tasks. It also has effects on their temperament and anger management, as do most addictions. The addiction also affects the attention span seen in adolescents. The results of the experiment taken in the study point to the fact that aggression in adolescents is directly correlated to the level of internet addiction that they suffer. A secondary argument from the article is that adolescents use the internet for many things today, not all of which are bad for attention span, and some are necessary, like ordering school supplies or paying bills. This brings complexity into the internet because it cannot be rejected all together, there are necessary and unnecessary elements to it.

This complex nature of social media use being beneficial and detrimental based on when and how it is used it corroborated by an article in the American Academy of Pediatrics Journal that focuses on child and adolescent use of social media (O'Keefe & Clark-Pearson, 2011). The article acknowledges that there are some benefits of social media, mostly in the way that it can

bring people together. The article mainly focuses on the negative effects of social media use in adolescents such as cyberbullying, sexting, depression, privacy concerns and interactions with third parties such as advertisers. The point of the article is that pediatricians should be aware of generally what a child is doing on the internet so that they can address any health issues that arise from the use of social media. This shows that this issue is widespread enough at hospitals and children's doctors are having to deal with it in high numbers.

The main technological aspect of this problem that would fall under the domain of RRI is the ease of use of these devices. It is amazing that we live in an age when a child of only one or two years can pick up a device more powerful than most that have preceded it and instantly learn how to use it. Companies that compete for the market take ease of use very seriously because it is something that most consumers value more than anything else. One thing that has come of this fight unfortunately is the fact that young children are very impressionable and easily hooked on "brainrot" videos and harmful media than an older, more mature person would be. In decades past, the internet was a lot harder to navigate, meaning that people on it were often older and less impressionable.

This emergence of the "iPad generation" is something that tech companies need to come to terms with and help form a solution rather than perpetuate the problem. Companies could invest more time in better child safety features and screening algorithms to keep harmful content away from children. It would not be popular but doing the right thing never is, companies could make their devices slightly more difficult to use and navigate. Because, honestly, a child of 1-4 does not have any real reason to be on a device in the first place. The only reason they should be on it is for educational purposes, but these activities would be supervised by an adult (Zhukova et al., 2020).

The research and literature investigating this topic exposes some of the actors behind the network that created this problem. Companies that produce these devices have the goal of maximizing profit which is what drives them. The parents that leave their children unattended with these devices for long periods of time are driven by stress and busyness that leads them to pacify their children. There are also the content creators on the internet that intentionally create media that is attractive to young children because of flashy colors and quick transitions, they are driven by profit as well. These actors all fall together to create an environment where it is really easy for children and adolescents to fall into the trap of internet addiction and addiction to harmful content. This trend is only increasing so breaking it is becoming more and more difficult.

<u>Conclusion</u>

While there can be positive results of teens and children spending time on the internet through portable devices, these benefits have not been realized by the majority of children and teens on the internet. The addiction to this technology is on the rise and the outcomes are not for the better. Children are becoming more and more dependent on these devices and their screen time to the point that they cannot perform in school because of their lack of attention span caused by excessive amounts of screen time. Adolescents suffer more from the constant use of social media and the polarizing effects it can have on them and the depression that it can cause. They are affected by the lack of attention span as well but their true cost is their happiness. They lose the ability to have fulfilling social interactions with real friends and their families so that they can have fake friends and seem happy to people online that they have never even met. The adolescents and young adults of tomorrow will have it much worse than the ones today because by then, they will be the children and toddlers burying their faces in screens all day, destroying

their attention span. That is why this issue is paramount and needs to be addressed and researched further because all of these children and adolescents will be the leaders and parents of the future and the ones that teach their children how to live. These concerns are not new ones though, every generation tends to look at the next one as less hard-working and softer than the ones preceding it. There was a scare similar to this with the advent of television and the generation X children that consumed it. But what we are seeing today goes much further than that and it is obvious from the studies conducted that this issue will not go away, this trend will continue.

Sources Cited

[1] Chang, H. Y., Park, E.-J., Yoo, H.-J., Lee, J. W., & Shin, Y. (2018). Electronic Media Exposure and Use among Toddlers. *Psychiatry Investigation*, *15*(6), 568–573. https://doi.org/10.30773/pi.2017.11.30.2

[2] Espiritu, M. (2016). *Early Childhood iPad Use and Effects on Visual Spatial Attention Span* (dissertation). Claremont Colleges, Clarement, CA.

[3] Kroshus, E., Tandon, P. S., Zhou, C., Johnson, A. M., Steiner, M. K., & Cristakis, D. A. (2022). Problematic Child Media Use During the COVID-19 Pandemic. *American Academy of Pediatrics* , *150*(3). https://doi.org/https://doi.org/10.1542/peds.2021-055190

[4] Maccoby , E. E. (1951). Television: Its Impact on School Children . *The Public Opinion Quarterly*, *15*(3), 421–444.

[5] Mthethwa, G. (2014). *INTERNET REGULATION OF HARMFUL CONTENT AFFECTING CHILDREN* (dissertation). University of Witwatersrand, Johannesburg, South Africa.

[6] O'Keefe, G. S., & Clark-Pearson, K. (2011). Clinical Report The Impact of Social Media on Children, Adolescents, and Families. *American Academy of Pediatrics* , 800–804. https://doi.org/10.1542/peds.2011-0054

[7] Shukla, A., & Kirmani, M. N. (n.d.). Effect of Internet Addiction on Aggression and Attention Span In Adolescents: Empirical Investigation. *International Journal of Humanities & Social Science Studies*, *9*(5), 154–163. https://doi.org/10.29032/ijhsss.v9.i5.2023.154-163

[8] Silverman, I. W., & Gaines, M. (1996). Using standard situations to measure attention span and persistence in toddler-aged children: Some cautions. *The Journal of Genetic Psychology*, *157*(4), 397–403.

[9] Young, K. S. (2017). Internet Addition Test (IAT). Wood Dale, Il; Steolting.

[10] Yusuf, A., Rachmawati, P. D., & Rachmawati, D. (2020). The correlation of Internet addiction towards adolescents' social interaction. *International Journal of Adolescent Medicine and Health* , *34*(5), 351–355.

[11] Zhukova, M. A., Kilani, H., Garcia, J. L., Tan, M., Parell, P. D., Hein, S., & Grigorenko, E. L. (2020). How Does a Toddler Experience Digital Media? A Case Study of a 28-Month Old Child Learning to Use the iPad. *Modelling and Data Analysis*, *10*(3), 5–23. https://doi.org/https://doi.org/10.17759/mda.2020100301