The Influence that Mobile Devices Have on Children K-5

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Are today's children becoming more skilled at swiping screens than playing outside? While mobile devices are a large cause for the lack of physical activity, other research has found that the environment of classrooms is also potentially reliable for the decrease in physical activity (Segura et al., 2021). However, while there are countless reasons for the development of unhealthy habits, children K-5 are spending a great deal of time behind the screens of mobile devices. Capabilities such as playing video games and indulging in media are one of the reasons why children are becoming avid users (Hosokawa & Katsura, 2018). Notably, these children are at an age where they have the greatest potential to better their physical capabilities but instead are not doing enough physical activity due to their long screen times (Mitchell, 2019). In addition to missing out on developing proper physical abilities, there has been research that shows the increased likeliness of illnesses in adulthood from a trend of sedentary behavior during childhood (Gunnell et. al, 1998). Considering the risks from excessive screen time and overuse of mobile devices, what exactly about them is attractive to children?

The overall design of mobile devices can be appealing to anyone, but specific software and hardware features may be one of the main reasons for the excessive usage by children such as mobile apps (Rosen et al., 2014). Designing technology in general is by no means an easy task and doing it for children is no exception. It is very important for mobile device engineers to carefully consider how the software and hardware features of mobile devices may negatively impact children.

Designing with good intent and outcome is an essential duty that engineers must uphold when developing their device because it would not be ideal to put users in harm's way. Although, the responsibility of designing safely can be one duty out of many that engineers must balance

since there are other responsibilities that they need to keep in mind according to the NSPE Code of Ethics. My research investigated whether engineers have a duty to design mobile devices in a way to not influence physical inactivity in children K-5 and if they have multiple duties besides this one, how exactly do they decide which duties matter more.

I argue that mobile device engineers have a responsibility to design their product to not influence physical inactivity in children K-5 based on the definitions of Kantian duty ethics and the Code of Ethics by the IEEE and NSPE. A variety of literature was used as there were secondary sources mainly from academic journal articles, blogs, and news articles. There were also a few primary sources from studies and research on the topic of mobile devices and children K-5. The secondary research provides the history and context of mobile devices and the problem of physical inactivity in relation to mobile device use. The primary sources were needed to investigate the observations and research on children K-5 and their usage of mobile devices specifically; as well as how the software and hardware design may be a cause for the excessive usage and thus lack of physical activity. The data collected from the sources involve the discussion of the software and hardware design of mobile devices for children K-5. Kantian duty ethics, NSPE and IEEE Code of Ethics will be used to analyze the data to determine whether the argument of mobile device engineers having a duty to design their devices appropriately for children K-5 is true. In my analysis when I find that it alludes to the idea that there are conflicting duties for mobile device engineers, then the same set of ethical references would be used to reevaluate and rationalize which duties exactly matter more in the context of mobile device engineering for children's wellness. Through the analysis I find that mobile device engineers have many duties and the obligation to protect children is one of them. Based on the analysis, I conclude that the most important thing engineers must think about when designing is

the obligation to promote safety, health and wellness for their users and children are no exception. Regardless, if a mobile device engineer believes that some duties may matter more, safety, health and wellness is the most crucial and must be upheld.

Literature Review

Physical inactivity along with a sedentary lifestyle is unhealthy. While there are many possibilities that could result in individuals choosing unhealthy habits, one large reason for children K-5 is from them excessively using mobile devices (Nguyen et al., 2018). The reason for the absence of physical inactivity is because of how prevalent and convenient it is for a child to use a mobile device such as a tablet, whether it is for educational or entertainment purposes.

One of the most dominant companies in the industry, Apple, quickly discovered that they could rely on this younger audience as consumers which led them to target their marketing to cater towards children ("Kids iPad Product' Marketing Plan"). This market scheme is very apparent when the first and second generations of the iPad were released in the early 2010s, which Apple marketed the tablet as a valuable learning tool for children (Halpert, 2012). It wasn't long until Apple could start seeing the marketing benefits as many children's applications in the app store appeared in the top charts for the most downloads and purchases, which became 15% of the $14 billion revenue for Apple in 2012 (Halpert, 2012). Even though Apple benefited greatly from this marketing plan for children, it resulted in the tablet usage in children to increase by 7% from 2013 to 2014 ("One in Three Children Now Have Their Own Tablet Computer," 2014).

Although it may seem that Apple is the reason for the excessive usage of mobile devices by children K-5, it is much deeper than that. The software and hardware design of mobile devices have a large influence for the longer screen times and shorter time spent on physical activity for children. One hardware design feature being that mobile devices are highly portable, making them very accessible anywhere (Hosokawa & Katsura, 2018). There is also the implementation of some software features such as voice assistance which children may find appealing to mock or play with. In one survey, around 36% of parents with a child aged 11 or younger say their child ever uses or interacts with a voice-activated assistant such as Apple's Siri or Amazon Alexa (Auxier et al., 2020). These design choices have been made by mobile device engineers as they are one of the major influences for how children K-5 have become so addicted to mobile devices.

Children are also human beings with their own rights and should not be neglected or undermined. John Wall, a Professor of Philosophy, Religion and Childhood studies at Rutgers University discusses Kantian duty ethics and provides clarity on the different applications that Kantian duty ethics has involving children. In Wall's work he also includes his own reasoning to expand further on duty ethics for children. Despite Kant arguing that children are objects to human rights and not capable of having rights themselves, Wall argues the opposite and sees children as equals to adults, able to be granted rights as well. One of the major ideas is that children need to be protected if the protector is liberated (Wall, 532). Overall, Wall reveals that human rights has been adult centered and that not only should children be required to have the same rights as adults but that there needs to be an opportunity for children to define their meaning of human rights (Wall, 542).

Engineers who are designing mobile devices should be wary of how they are designing. More specifically, they must keep in mind of the Code of Ethics and standards by the IEEE and NSPE. The IEEE is the Institute of Electrical and Electronics Engineers and the objective with their Code of Ethics is to ensure that engineers are producing electronics that do not hinder quality of life of their users (IEEE Code of Ethics). There is also great emphasis on the concept that engineers are obligated the moment they take up the profession of being an engineer. Therefore, from the IEEE Code of Ethics, electronic engineers are obligated to uphold highest standards for ethical and professional design (IEEE Code of Ethics).

In addition to the IEEE Code of Ethics there is also the Code of Ethics by the NSPE. The NSPE is the National Society of Professional Engineers which not only includes mobile device engineers alone but also every type of engineers that exist in a professional field. Their Code of Ethics focus on the foundations of ethics such as fulfilling the duty to ensure safety, health, and wellness of the public. Their concepts also include dealing with superiors to which engineers must act faithfully towards (Code of Ethics | National Society of Professional Engineers).

Methods

To best support my claims and analyze the information I have gathered, I will be making use of the definitions from Kantian duty ethics along with Wall's interpretation on that matter and refer to the Code of Ethics by the IEEE and NSPE. To refer to my argument again, I argue that mobile device engineers have a responsibility to design their product so that it does not influence physical inactivity in children K-5. Kantian duty ethics is crucial to emphasize the important duties and responsibilities that any individual has but with Wall's work I seek to

provide additional ideas that duty ethics has for children. The Code of Ethics from the IEEE and NSPE serves the purpose of analyzing claims that relate to specific engineering duties and responsibilities. All together the concepts that I will be taking from these tools of ethical thinking will help provide thorough analysis on whether the software and hardware design of mobile devices do support my argument that there is a duty of designing to not influence physical activity in children K-5.

Analysis

The early mobile devices were meant to be designed for adults and professionals. One of the notable early mobile devices, Blackberry, had capabilities of sending emails and limited web browsing (Pilon, 2019). This resulted in adults and professionals becoming avid consumers as they were able to benefit more from these devices than anyone else such as children. Throughout the generations of mobile devices over the years, they became smaller and thus more portable and accessible (Hosokawa & Katsura, 2018). The development of a smaller and highly portable device implies that a user of a smaller stature would be comfortable with this design and so children may have been what engineers had in mind as a user. At this point mobile device engineers must have had a duty to design their device to be suitable for children in the context of safety. A device too large would bring greater risk in damaging the device or harming the children themselves for which they must be protected and cared for according to the teachings of Kantian duty ethics as interpreted by Wall (Wall, 532). One may believe that engineers had no obligation to design their device with children in mind but rather to design for simplicity's sake. Designing for children can become too complex and demanding because certain safety features may take more effort and resources to implement. Although somewhat true, the bigger concern is

for engineers to design a device that promotes safety, health, and wellness according to the IEEE ("IEEE Code of Ethics," n.d.). Designing for simplicity is a part of what mobile device engineers had in mind but they most likely had to prioritize the guidelines by the IEEE.

The addictive behavior and excessive usage towards mobile devices are due to many reasons with one being the software design such as dark patterns that developers have been integrating into some apps for children (Radesky et al., 2022). These dark patterns refer to application features that can monetize based on advertisements which encourage in-application purchases, the features being implemented by the developers of mobile devices (Radesky et al., 2022). Mobile devices also began including software features that were targeted specifically for children such as parental controls. However, these controls were rarely used due to most parents not being aware of their existence since only 14% of parents have confirmed to check their children's mobile device usage according to research done by RS Components (Brown, 2019). With the lack of attention to the children and addictive software features, they end up engaging more on the screen than doing enough physical activities (Mitchell, 2019). With mobile devices becoming more prominent in children's lives, engineers designed their device with the intent to ensure the safety and appeal to children but have failed to realize that there is the consequence of the design features they implemented. It can be argued that designing and implementing specific features for children with the intent to protect them is morally correct, however, the outcome of those design choices displays the opposite. Children becoming physically inactive and developing unhealthy habits is not safe, healthy or positive for their wellbeing.

Mobile device engineers have multiple duties they need to balance out. Children are not the only users of mobile devices since there are also business professionals, students and other types of users that need to use mobile devices for their own reasons. Designing for children is

one duty that mobile device engineers must consider but since there are other users as well, indicating that they must ensure the safety, health and wellness of these other users through specific design features of their mobile device. Although it seems plausible that the duty to ensure safety, health and wellness is the same across all users regardless of who they are, this idea does not cover the specific consequences that certain users may face if the design is not suitable for them. One design feature may ensure safety for one user but not for another, so it is best to design precisely for each user. Mobile device engineers also have a duty to listen to their superior and to design for the better of the business' profits. Meaning that ethically, engineers have to act faithfully towards their employer and clients according to the NSPE Code of Ethics (Code of Ethics | National Society of Professional Engineers). Therefore, if a business wishes for their engineers to implement a design feature, they must comply. However, it is also not wrong for engineers to not listen to their employer and instead design based on what they believe is morally right. Except, engineers could lose their opportunity to participate in the design of these mobile devices if they go against superior and business objective; so, they must maintain the duty of being faithful towards their employer which shows that out of multiple duties there potentially exists some responsibility that takes priority over others.

The duty that takes priority is designing for the wellness of children because it would be unethical to indirectly promote an unhealthy lifestyle through the design of a mobile device. According to the IEEE through Johnson's discussion on engineering ethics, they believe that technology should always be designed to emphasize safety, health and welfare of the public and that devices should strive to have an ethical design to support these beliefs (IEEE Code of Ethics). The IEEE does not believe that business matters more or that profit matters more, there is instead a great emphasis on health and welfare which suggests that mobile device engineers

must be prioritizing design for the wellbeing of children. Even though it is plausible to think that these design features such as parental controls and a smaller size device do promote safety, health and welfare for the children, they are indirectly contributing to children becoming addicted to these devices and not doing enough exercise since these features fail to prevent the excessive screen time. There is an obligation to protect children and to ensure their welfare by providing the appropriate resources. Kant believes that children should be protected but Wall adds on that by emphasizing the importance of providing the appropriate resources for children (Wall, 538). This suggests that protecting children is not enough but to provide children the appropriate design features on a mobile device is necessary. Prioritizing the duty of designing for children's safety therefore is not limited to only protecting but to also offer capabilities and features that teach children the importance of keeping them healthy is crucial. On the other hand, it may be probable to think that it is not a priority to design for the safety of children since the current design features are already protecting children in some way. However, with the apparent lack of physical activity in children, the current design features are clearly not appropriate enough since health and wellbeing are being compromised even if safety is being promoted.

Conclusion

There are various duties that mobile device engineers must carefully consider when designing their device. The engineers themselves may believe that they are prioritizing their duties correctly because of the good intentions in mind or because they do not want to lose their job if they were to go against what they are told to do. Ultimately, even if duties conflict the most important obligation that the mobile device engineers have is to design for safety, health and wellness of the people or in other words those who have access to this type of technology.

This means that mobile device engineers have a huge responsibility to ensure that the children who are using these devices frequently are not in harm's way. Since there is the trend of children K-5 who own a mobile device becoming physically inactive this suggests that mobile device engineers need to reevaluate their design choices.

My research is not limited to those in academia or mobile device engineers that may be interested in wanting to know what exactly is wrong with the design of mobile devices. I believe engineers from different fields may want to investigate as well. It would help provide a better understanding of engineering ethics as a general concept which may sprout possible solutions to other design problems that these other engineers may have with their own artifact. It could also bring upon a different perspective in how an engineer should think in a certain discipline since it may differ from another. Anyone reading my research may also invest time into looking at what exactly could be designed differently about a mobile device to make sure that they are truly promoting the safety, health and wellness of children K-5 to the best of abilities. It would be useful if the parents or even the children themselves were to be involved since it would allow for direct opinions which could help expand current solutions into becoming more effective.

Although it is very difficult to relay any of these meanings to the current mobile device engineers. I hope it aspires future engineers that are interested in this field of work to evaluate their morals carefully and to ensure the best possible outcome for their users, especially children as they grow up. Mobile devices need to be treated and designed properly since a handful of children K-5 will always be using them unless some other artifact takes its place.

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