

How Smartphones Have Changed Us

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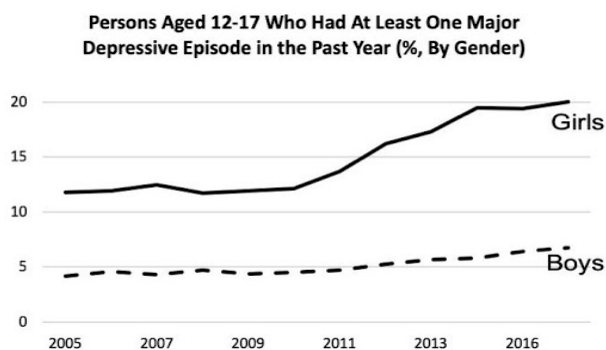
In today's day and age, smartphones are all but a fact of life. They allow us to contact people across the world instantly and access anything we could possibly want to know with a simple google search. There are endless ways to kill time with smartphones, including video games, social media, and streaming services. The benefits of smartphones are undeniable, but how have they affected the way we think and behave? How do smartphones affect children? The recent Covid-19 pandemic makes this question more relevant than ever before as millions of people around the world have few ways to communicate outside of smartphones and the internet. In this article, I want to focus on two questions:

- 1) How has the presence of things like smartphones and social media negatively affected adolescents?
- 2) Have smartphones affected our cognition?

In answering these questions, I hope to address some of the most important findings in recent years about the effects of technology on our behavior.

Smartphones and Adolescents

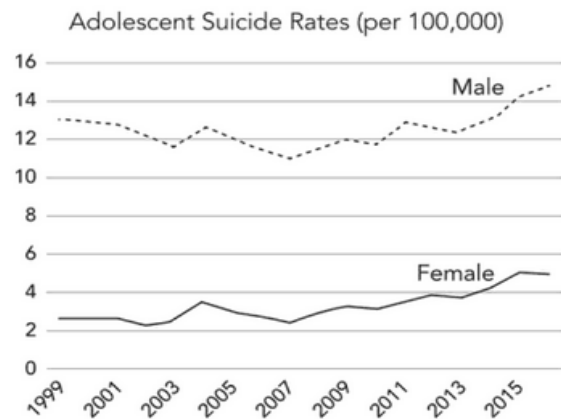
The World Wide Web was invented in 1989 (Woodford), but it wasn't until much later that technology started to have an effect on teens. The iPhone was initially released in 2007, but it was expensive: The cheapest version could be purchased for \$499. But, just a year later in 2008, iPhones could be bought for just \$199. Still not cheap, but less than half of the \$499 price tag. This is where it gets interesting. Take a look at these graphs:



Graph 1-retrieved from <http://www.kaisems.com/principals-log-february/>.

Remember, iPhones and other smartphones started to become more available in 2008. Just a couple of years later, there was a major spike in depressive episodes

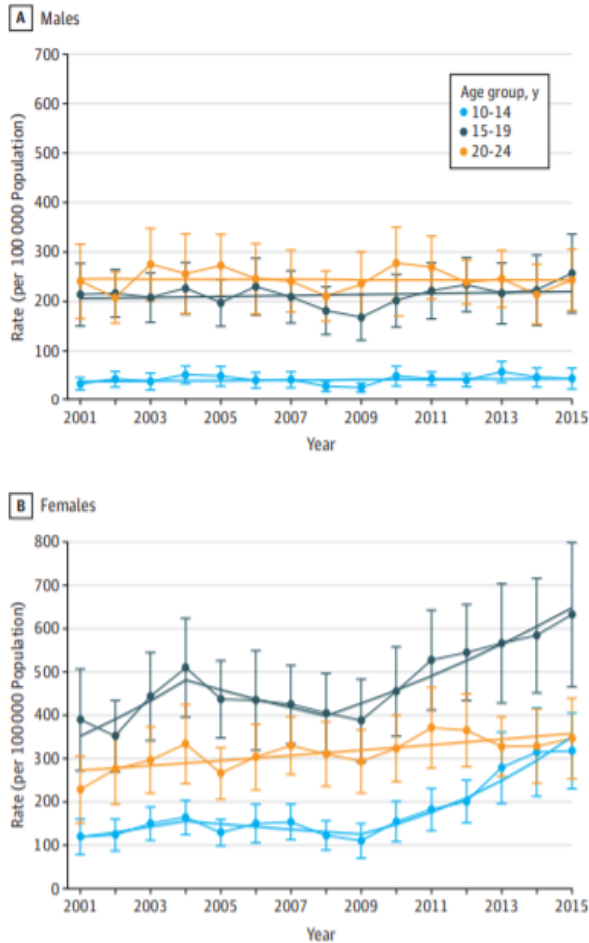
in teens. The percentage of boys who'd experienced a depressive episode in the past year had hovered around 4% for many years, but it increased to 7% in less than a decade. This doesn't seem like a lot, but it's actually a considerable increase considering the length of time over which it occurred. What's really striking is the data on depressive episodes among young girls: After sitting around 12% for decades, it jumped to 20% in just 7 years. Take a look at this graph showing adolescent suicide rates:



Graph 2-retrieved from <http://www.kaisems.com/principals-log-february/>.

The trends in this graph aren't as pronounced as those in the last graph, but they're there nonetheless. After fluctuating between 11 and 13 suicides per 100,000 adolescent boys from 1999-2007, adolescent male suicide rates increased to 15 per 100,000 over a period of 8 years. Adolescent female suicide rates increased from around 2 per 100,000 in 2007 to 5 in 100,000 in 2015, the same period over which smartphones were introduced to adolescents. Here are two more graphs on hospital admissions for self-harm among boys and girls between 2001 and 2015:

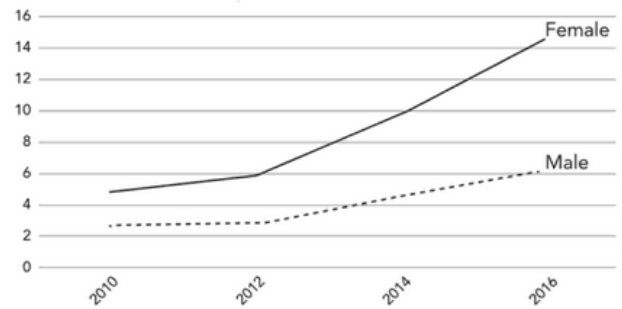
Figure. Nonfatal Self-Inflicted Injury Emergency Department Visits Among Youth Aged 10 to 24 Years in the United States, 2001-2015



Graphs 3 and 4- retrieved from Mercado et al. "Trends in Emergency Department Visits for Nonfatal Self-inflicted Injuries Among Youth Aged 10 to 24 Years in the United States, 2001-2015."

While boys haven't seen much of a change between 2001 and 2015, girls seem to have been affected significantly. The changes in the trend in hospitalizations due to self-harm in girls age 20-24 has been increasing since 2001, but there doesn't appear to be a pronounced change that coincides with smartphone usage. In girls age 15-19, however, there was a significant increase between 2009 and 2015, much like the rate of depressive episodes among adolescent girls over the same time period. What's really staggering is the 10-14 age group. The rate of hospitalization for self-harm among girls age 10-14 tripled from around 100 per 100,000 in 2009 to more than 300 per 100,000 in 2015. Here's one more graph:

Percentage of College Students Who Say That They Have a Psychological Disorder



Graph 5-retrieved from <http://www.kaisems.com/principals-log-february/>.

Why do the trends in this graph start to increase so much later than the trends from the previous graphs? The answer is simple: As we can see from the graph of hospital admission due to self-harm among girls, the rates among girls age 20-24 didn't change a lot. The rates among younger girls, however, increased drastically. Those first adolescents that started to get smartphones around 2008-2009 began entering college in 2012, which is when reported psychological disorders in college students began to rise. Clearly there have been changes in both males and females, but young girls seem to have suffered the most.

I want to make something clear: I'm not saying that cell phones and social media have only bad effects on adolescents (although social media seems to be leaning in that direction). Cell phones make it easier for parents to communicate with and keep track of their kids, and being able to find virtually any piece of information you could possibly want to know in seconds is a definite upside. The question is not whether or not technology is good or bad for adolescents; it can be either depending on how it's used. The question is of how it's being used by adolescents, and how those uses are affecting them. It may not be all bad, but it's not all good either.

How Smartphones Affect Cognition

How have smartphones changed our cognition? The belief that our attention spans are getting shorter and we're starting to crave instant gratification more than ever before is becoming quite common, but what's the evidence for this? A 2017 article published in *Frontiers in Psychology* says it well:

"...sensationalist articles with titles such as, "Are Smartphones Making Us Dumber?" (Ellison, 2012) and, "Is Your Smartphone Making You Fat and Lazy?" (Morin, 2013) encourage the conclusion that reliance on smartphones and related technologies is not

aiding mental functioning, but rather, is having a negative impact on our ability to think, remember, pay attention, and regulate emotion. Some have even made the claim that modern connectedness is “rewiring our brains” to constantly crave instant gratification and that this threat to our society is “almost as important as climate change” (Greenfield, 2013). Are these simply examples of an older generation once again thinking its “progeny yet more corrupt?” (Horace, 20BC) or is there some evidential legitimacy to these fears?” (Wilmer et al.)

Although this article is approaching three years old as I write this, much of its contents remain relevant today. First, it cites another article that concluded that attention spans are shrinking among children with smartphones (Nikken & Schols 2015). Another study found that even when we're doing something in an app on our smartphones, other apps can delay what we were doing in the original app by 400% (Leiva et al., 2012). Yet another study found that even if we don't actually use our smartphones, even hearing or feeling a notification is enough to throw off our ability to concentrate (Stothart et al., 2015). That's not all; just having a phone in close proximity without notifications is enough to throw off our ability to complete demanding tasks (Thornton et al., 2014). Even so, Wilmer et al. say that there is limited evidence that smartphones permanently influence our attention spans. Smartphones will affect our ability to focus as long as we are using them or have them in close proximity, but that ability tends to come back when we take a break and unplug (Wilmer et al., 2017).

Smartphones can also affect memory. We're also less likely to remember information that we believe will be accessible later such as phone numbers and photographs (Sparrow et al., 2011). However, this might not be a bad thing. It might be easier to simply remember the location of complex information than it is to remember the information itself (Barr et al., 2015). Even so, there are some tradeoffs. In a 2013 experiment, researchers found that individuals who photographed their vacations were less likely to remember them (Henkel et al., 2013). A similar study, however, found that taking photographs actually improves visual memory but hinders auditory memory (Zauberman et al., 2015). However, a 2015 study found a negative relationship between working memory and frequency of multitasking on digital media. Additionally, individuals who frequently practiced digital media multitasking also had a noticeably worse capacity for long-term memory (Uncapher et al., 2015). It seems like there are mixed results in correlational research between smartphone

use and memory, but more research is sure to come in the next decade.

More generally, greater smartphone and social networking use are somewhat correlated with poor academic performance according to research compiled by Wilmer et al. Smartphones also damage our ability to sleep because of the blue light they emit as well as the stimulating activities they offer (Cain & Gradisar 2010). This effect on sleep is especially of concern because roughly $\frac{2}{3}$ of Americans admit to sleeping with their phones close by, and that's just the self-reported data; the actual number may be higher (Abbott 2020).

Much of the research in this field is dated but still relevant, and more is being conducted with each passing year. This research isn't conclusive, but most seem to agree that smartphones probably have some adverse effects on our cognitive functioning to one degree or another.

Conclusion

Although research on the effects of smartphone use on cognitive ability is somewhat limited, the research being done on smartphone and social media use in adolescents is staggering. It seems that digital media has increased depression, self-harm, and suicide rates in adolescents, particularly girls. The world probably isn't going to end because of this, but it's worth talking about, especially during this Covid-19 pandemic when smartphones are more relevant than ever. I'm not saying we shouldn't use smartphones, but I think we would all benefit from using them just a little bit less, especially children and teenagers.

REFERENCES

1. Abbott, T. (2020). Cell Phone Behavior Survey: Are People Addicted to Their Phones?. reviews.org. Retrieved from https://www.reviews.org/mobile/cell-phone-addiction/#Smart_Phone_Addiction_Stats.
2. Barr, N., Pennycook, G., Stolz, J. A., and Fugelsang, J. A. (2015). The brain in your pocket: evidence that smartphones are used to supplant thinking. *Comput. Hum. Behav.* 48. <https://doi.org/10.1016/j.chb.2015.02.029>
3. Bethune, J. (2020). *Principal's Log (February) – KAIS EMS*. Kaisems.com. Retrieved from <http://www.kaisems.com/principals-log-february/>.

4. Cain, N., and Gradisar, M. (2010). Electronic media use and sleep in school-aged children and adolescents: a review. *Sleep Med.* 11. <https://doi.org/10.1016/j.sleep.2010.02.006>
5. Henkel, L. A. (2013). Point-and-shoot memories: the influence of taking photos on memory for a museum tour. *Psychol. Sci.* 25. <https://doi.org/10.1177/0956797613504438>
6. Leiva, L., Böhmer, M., Gehring, S., & Krüger, A. (2012). Back to the app. *Proceedings Of The 14Th International Conference On Human-Computer Interaction With Mobile Devices And Services - Mobilehci '12.* <https://doi.org/10.1145/2371574.2371617>
7. Mercado, M., Holland, K., Leemis, R., Stone, D., & Wang, J. (2017). Trends in Emergency Department Visits for Nonfatal Self-inflicted Injuries Among Youth Aged 10 to 24 Years in the United States, 2001-2015. *JAMA*, 318, 1931. <https://doi.org/10.1001/jama.2017.13317>
8. Nikken, P., & Schols, M. (2015). How and Why Parents Guide the Media Use of Young Children. *Journal Of Child And Family Studies*, 24(11). <https://doi.org/10.1007/s10826-015-0144-4>
9. Sparrow, B., Liu, J., and Wegner, D. M. (2011). Google effects on memory: cognitive consequences of having information at our fingertips. *Science* 333. <https://doi.org/10.1126/science.1207745>
10. Stothart, C., Mitchum, A., and Yehnert, C. (2015). The attentional cost of receiving a cell phone notification. *J. Exp. Psychol.* 41. <https://doi.org/10.1037/xhp0000100>
11. Thornton, B., Faires, A., Robbins, M., and Rollins, E. (2014). The mere presence of a cell phone may be distracting implications for attention and task performance. *Soc. Psychol.* 45. <https://doi.org/10.1027/1864-9335/a000216>
12. Uncapher, M. R. K., Thieu, M., and Wagner, A. D. (2015). Media multitasking and memory: differences in working memory and long-term memory. *Psychon. Bull. Rev.* 23. <https://doi.org/10.3758/s13423-015-0907-3>
13. Wilmer, H., Sherman, L., & Chein, J. (2017). Smartphones and Cognition: A Review of Research Exploring the Links between Mobile Technology Habits and Cognitive Functioning. *Frontiers In Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.00605>
15. Woodford, C. (2020). *Technology timeline.* Explain that Stuff. <https://www.explainthatstuff.com/timeline.html>.
16. Zauberman, G., Silverman, J., Diehl, K., and Barasch, A. (2015). Photographic memory: the effects of photo-taking on memory for auditory and visual information. *NA Adv. Consum. Res.* 43.