"This book is deeply researched ... a must-read for parents and teachers."

— *MENSA BULLETIN*

SCREENFORMATION 2.0

The latest scientific studies, educational research, and expert commentary on the harmful effects of screentime

ROBERT ROSE-COUTRÉ, M.A.

Screenformation 2.0

2nd Edition of the book that brings together major scientific studies, educational research, and expert commentary on the harmful effects of screentime

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Dedication

This book is dedicated to my wife, Mitra Rose-Coutré

Acknowledgement

I would like to acknowledge Mitra Rose-Coutré for her astute editorial contributions and advice.

PART I:
Screen Science

INTRODUCTION

Screentime has been a topic of controversy for several generations. We've heard how our digital world promotes global communications, provides learning opportunities that were not possible in the past, helps us stay in touch with each other long distance, and gives us access to almost any information instantly. We hear digital technology can bring the global human family closer together.

On the other hand, we've heard that screentime isolates us, divides us into our segregated echo chambers, leads to depression, impairs mental and physical development, and takes away from more active and social pastimes.

These are commonly discussed issues, but they are not commonly understood. One of the first misconceptions people have is that there's not a lot of research on the effects of screentime. The fact is, there is a wealth of scientific studies, educational research, and expert commentary on how screentime has impacted individuals and the population writ large today and over the past fifty years. But that rich scientific knowledge is not widely communicated to the general public; hence, the misconception.

To help remedy that misconception, this book compiles and communicates the rich body of knowledge to the reader. It provides a comprehensive, well-documented investigation into how mind and body respond to screentime. It pulls together the findings into one place for convenient access, including research from the biological, psychological, physiological, sociological, and behavioral sciences on the subject of screentime. The Works Cited section provides more than 200 references, which are explored in-depth throughout the text.

The findings are astounding in their consistency and universality, pointing to the same conclusion: Screentime significantly damages many areas of brain development, mental health, and physical health. To name a few areas of concern, screentime damages basic brain function, mental health, creativity, reasoning, concentration, attention span, problem solving, social skills, empathy, emotional development, motor skills, and physical health.

If that seems exaggerated, don't take our word for it. Check the studies, the research, the findings, and the facts, which are now readily available and easy to access.

Screen-related damage takes many forms. Brain and body suffer, quality of personal and social life degrades, overall human experience shrinks down to a fraction of what we experienced all those millennia before the age of screens. But the bad news conversely points to the better path forward. With heightened awareness of the harmful impacts, we can build our own immunity to screen-related injury. Instead of thoughtlessly following everyone else's daily slog through the mind-numbing sea of screens, we can forge our own active-living path, to create a better life for ourselves and our children.

CHAPTER 1: BRAIN AND BODY DEVELOPMENT

Alpha Waves

We begin our investigation into the science of screentime by addressing the screen's biological effect on brainwaves. Brainwaves are associated with states of mind, such as critically alert (Beta Waves) versus passively receptive (Alpha Waves).

Based on a groundbreaking "Alpha Wave" study by Dr. Herbert E. Krugman[1], and others since then, screen viewing alters the brain by making it suggestible. The act of watching content on-screen switches our brainwaves from active to passive.

Our awake state involves Beta waves. Beta waves facilitate active thinking, "beta waves are associated with alertness, activity." Conversely, Alpha waves are slow and are not associated with alertness. "Alpha waves are not simply slow Beta waves; they are a new parameter." Krugman's research revealed that screen viewing switches the brain from Beta to Alpha waves. Krugman explains how our brainwave variation makes us process screen information differently from print information. The print-reading response is "active and composed primarily of fast brain waves, whereas the response to television might be understood as passive and composed primarily of slow brain waves." Perhaps the most profound finding in the brainwave discovery was that the brain switches from active-thinking Beta Waves to passive non-thinking Alpha Waves in less than a minute from the start of viewing, and it makes no difference what's on—the screen itself causes the switch to passivity.[2]

Suggestibility makes us easier to influence. We are more receptive to the simulation of reality presented on the screen. That fact alone—that screen-viewing makes our brains less active and more easily influenced—undermines brain health in general. An abundance of subsequent biological and psychological research has shown that screentime causes mental decline, altered perception of reality, and other types of damage in addition to suggestibility.[3] It should be no surprise that Alpha waves are also associated with hypnosis and hypnotic suggestion. When we are watching our screens, we are not aware of this shift from active to passive brainwaves.

We watch TV approximately 30 hours a week.[4] On smartphones, tablets, and laptops, we are estimated to consume the equivalent of nine DVDs-worth of data per day, per person.[5] As reported by Victor C. Strasburger, MD, in an American Academy of Pediatrics study, "Young people now spend more time with media than they do in school—it is the leading activity for children and teenagers other than sleeping."[6] As a result, we spend almost every hour of every day in a passive Alpha Wave state of suggestibility.

This shift in our population from spending our waking hours in an active alert state of mind, to spending our waking hours in a passive suggestible state of mind, is a relatively recent shift. Humans spent 200,000 years in the active Beta Wave state, 100 percent of every waking hour, every day. Suddenly in the past 30 to 50 years, we became a perpetually passive, receptive species, limited to a lifelong Alpha Wave state of existence. Our new perpetual screen-surround life experience undermines human development, which in turn diminishes human variation. It increases our conformity and uniformity. The shift has a dramatic narrowing and homogenizing effect on our species.

Critical Processing

Screentime suppresses our ability to critically process information. Our minds are constantly bombarded by stimuli and data—news and information conveyed via fast-changing images on a screen. As we saw in the "Alpha Waves" section, the screen puts us into a passively receptive state. But before the mind can analyze news and information successfully, it must be in an active state. Then it can draw comparisons and relations with sustained comprehension.

Reading or talking to another person activates the region of the brain that prepares us to logically process information and critically evaluate it. The mind is already "in gear" as it encounters arguments and concepts in a book or in a conversation.[7] Conversely, watching TV or video does the opposite. In experiments tracking brainwaves while subjects watched TV, "The EEG studies similarly show less mental stimulation, as measured by alpha brainwave production, during viewing than during reading."[8]

We now know this fact: we cannot critically process video-format information as reliably as reading the same information. That means when we consume information via TV and video, we are more likely to accept whatever we see "as true" without thinking, and without realizing it (unless it contradicts our pre-existing *confirmation bias*, covered later in this book—in that case, we dismiss it out of hand as false, also without thinking). Watching video, our brain is not prepared to process anything competently.[9]

Even instructional videos—created and consumed for the purpose of learning—fail to instruct. Ed O'Brien, social psychologist at the University of Chicago, devised a series of experiments to understand the effect of instructional videos on people.[10] He found there was a gap between the perception of learning and actual learning. Volunteers watched a variety of instructional videos from one time to twenty times. Participants who watched twenty times were much more confident that they could perform what the video was teaching. In fact, none of the participants improved by watching the video. Whether watching once, or twenty times, "there was absolutely no effect of video-watching on actual performance." Even the most confident participants could not transfer watching, to actual learning or doing. Watching an instructional video, "It seems to convince people that they have learned everything to perform the same task." When they try to perform the task, however, they discover they did not learn anything. Conversely, the study showed "Reading an instruction manual … didn't produce the same overconfidence." As one of the participants noted, "When I watch the video, what I think I'm losing is, I'm losing the ability to gain the skill. I think I'm tricking my mind to think that, you know, I'm getting that skill. I watched the video. I know how to do it. In reality, that's not true."[11]

The overwhelming evidence from multitudes of studies shows us that screentime impairs our learning ability and damages our brain capabilities in many ways.[12] But it's not as harmless as merely becoming less informed. The screen shapes our minds to be vulnerable and receptive to simplistic screen-information, including *mis*information. Video-induced Alpha Waves make us accept bad information while making us less competent to intelligently evaluate any information.[13]

With impaired logical processing, our receptive condition renders us defenseless against manipulation, even while we think we are in full command of our faculties.

We cannot feel the Beta-Alpha "switch" happening while we are watching screens. That lack of awareness makes us more easily influenced. We think we are processing information just fine, but in fact we are accepting information without critically processing it.

The screen experience biologically prevents us from thinking for ourselves. A screen-informed mind is not an informed mind. It is merely reshaped and populated by prepackaged messaging. The decision to rely on TV for information is a poor decision. It illustrates the poor judgment brought about by watching TV. The vicious cycle feeds itself.

Secondhand Exposure

We have found ample evidence of the screen's debilitating effects on our mental abilities. But the effects on children are more insidious. The Alpha wave state undermines child development even when the children are not directly watching the screen. American Academy of Pediatrics Research on the effects of TV on children found that "Casual exposure (to TV) can harm their language development, making it harder for them to cope when they go to school … Children are as vulnerable to the effects of 'passive TV' as they are to secondhand smoking, according to experts… As well as discouraging the amount of screen-time to which youngsters are exposed, it cautioned against adults watching television with them nearby. It said parents needed to understand that 'their own media use can have a negative effect on children'. … the data should serve as a 'wake up call' to parents."[14]

The wakeup call to parents is especially important during the first two years of their child's life: "The risk of television delaying learning in infants is so great that the American Academy of Pediatrics recommends that babies under the age of 2 be banned from watching altogether."[15]

While the very atmosphere created by a TV in the room undermines child development, the atmosphere created by books in the room actually enhances child development. A study of 160,000 adults between 2011 and 2015 found that having eighty or more books in the home results in

adults with stronger cognitive competencies. The study found that a home library promotes greater math and literacy skills, information communication technology (ICT) skills, and lifelong habits of knowledge seeking. Adults with high-school-level education acquire these skills equal to university graduates who grew up with only a few books in the home.[16] It's the parents' job to set the tone, better or worse for their children's future.

Mental Muscle

Like a muscle, the mind requires exercise to build strength. As a result of mental exercise, we become smarter. As *Emotional Intelligence 2.0* author and clinical psychologist Travis Bradberry notes, "your brain grows new connections much as your biceps might swell if you started curling heavy weights several times a week. The change is gradual and the weight becomes easier and easier to lift the longer you stick to your routine … the brain cells develop new connections to speed the efficiency of thought…."[17]

By failing to exercise brain cells, they weaken and don't function as well. Screentime is not brain-exercise, it's brain-massage. Screen-stimulation acts like a delicious massage to the brain. The brain weakens like a muscle that is pleasantly massaged, but never exercised. Without exercise, the massaged mind feels good, while getting flabby. A multitude of studies and research have established the fact that passive screentime atrophies the mind. We know that screentime robs the mind of energy, thinking, problem-solving skills, logic, empathy, creativity, mental health, and emotional development.[18]

Replacing mental exercise with mental massage, people become less able to "self-stimulate" their own brains, or initiate their own mental activity, the way humans did from the beginning of human history until the mid-1900s. As the passive screen experience effortlessly stimulates brain cells, so the ability to initiate one's own brain-cell activity is put to sleep, deteriorated like an atrophied muscle.[19]

Children are especially vulnerable to damage from a lack of mental exercise. Noted in the *Scientific Learning* article entitled, "This is Your Child's Brain on TV": "Children require face-to-face contact from

caretakers who provide verbal and non-verbal clues to kids that television—no matter how kid-friendly—cannot … Since brain circuits organize and reorganize themselves in response to an infant's interactions with his or her environment, exposing babies to a variety of positive experiences (such as talking, cuddling, reading, singing, and playing in different environments) not only helps tune babies in to the language of their culture, but it also builds a foundation for developing the attention, cognition, memory, social-emotional, language and literacy, and sensory and motor skills that will help them reach their potential later on."[20]

The important takeaway is that screentime cannot replace this foundational real-world development.

Motor Skills

According to child-development experts, children's mobility levels are at an all-time low. Research has revealed that a concerning number of today's 4-year-olds are not physically ready to start school. Screentime is preventing development of fundamental coordination such as balance and motor skills.

"They suffer lack of motor skills and reflexes. Almost 90 percent of children demonstrated some degree of movement difficulty for their age… Children lack the ability to complete simple tasks such as sitting still, holding a pencil, putting on their shoes, and especially reading… In a supplementary study of 25 Foundation Stage teachers, 80 percent said they had identified a sudden decline in physical mobility happening within the past three to six years…The reason? Today's children are less active in their early years compared with previous decades, with typical movements associated with play and development reduced by electronic toys and screens."[21]

More studies are finding the same results. A December 2018 clinical report from the American Academy of Pediatrics found that as screentime displaces traditional play and traditional toys (e.g., fine motor examples, such as blocks, shapes, puzzles, trains, etc., and gross motor examples, such as large toy cars, tricycles, and push and pull toys), children experience reductions in both fine motor, adaptive, and gross motor skills and abilities.[22]

One troubling effect of these childhood deficiencies is permanently reduced dexterity through adulthood. For example, as *The Daily Mail* reports, there has been "a decline in the dexterity of students in just the past decade … Surgery students struggle to use their hands because they spent too much time in front of a screen growing up." Surgeons are becoming less developed in tactile skills, "less competent and less confident in using their hands." This is not encouraging for those who will need delicate life-and-death surgery in the future. But the dexterity deficiency affects all professions, not just medicine. Think of any assembly-line factory and the replacement of humans with robots. As humans become less competent with their hands, robots increasingly replace people in the workplace.[23]

We can no longer assume people can do practical things, cutting things out, making things. If in this fundamental area of physical development, using our hands for basic activities, standards become lower across the population.

Verbal Skills

One of the most important areas of child development, linked to overall cognitive health, is verbal skill. Children watching TV suffer severe declines in vocabulary, which damages their ability to think. Their verbal skills are less developed than they would have been if they had not watched TV. Scientific studies have shown that children learn words by interacting verbally with other humans—by watching and listening to parents in real conversations—and that screentime delays verbal development.[24] TV cannot imitate it, replace it, or even supplement it. TV can only undermine it.

To fully learn words and concepts, we have to experience the moment when words are used in real life, in relation to real people and things in a three-dimensional-world context. TV experience is not a real-world experience. If we don't experience real-world context, we don't learn as well. "Research conducted during the next two decades removed any doubt about the impact of early brain stimulation on a child's later cognitive development. … they were able to demonstrate that environmental factors can alter neuron pathways during early childhood

and long after … among the most important of the environmental factors … are the language and eye contact an infant is exposed to [and] … the number of words an infant hears each day is the single most important predictor of later intelligence, school success and social competence. But there's one catch. The words have to come from an attentive, engaged human being … radio and television do not work" (Winn).[25]

With real-life interaction, as with reading, the brain is activated and able to learn. The effect of TV is to turn off the learning process.

The American Academy of Pediatrics warns parents, "It may be tempting to put your infant or toddler in front of the television, especially to watch shows created just for children under age two. But the American Academy of Pediatrics says: Don't do it!"[26]

Comparisons

People have always been different—some better some worse—in every skill. But comparing self with others is disingenuous because it dodges the important comparison: self "as is" versus self "as could be."

Columbia University Professor of Psychology E. Tory Higgins explains that recognizing this discrepancy—"actual self" versus "can be" self—is referred to as self-discrepancy—"i.e., I am *not* fulfilling my potential."[27] It is known to be associated with depression: "What's wrong with me? I know I can be what I would like to be but I am not doing it."[28] It goes hand-in-hand with related sentiments about screen-viewing behaviors: "I don't want to watch as much as I do, but I can't help it."[29]

But recognizing the discrepancy between the "as is" self and the "as could be" or "I can be" self, is an essential step towards deciding to close the gap. Facing failed potential, the "dissatisfaction … may motivate someone to try harder. (e.g., '…Why am I so lazy? I know I can do better. I've got to try harder!')."[30]

Passive screentime makes our "as is" self *lower functioning* than our "as could be" self. Screentime also undermines our motivation so it becomes harder and harder to climb out of this rut. Screentime diminishes inherited potential, regardless of how one compares with others. Over time, lower functioning manifests itself as less achievement, and therefore less fulfillment. The saddest part of choosing a "lesser me"

is the regret, which comes later in life when we realize what we have lost. As *The Motivation Myth* author Jeff Haden aptly states on the topic of this type of regret, "Sure, the work is hard. Sure, the work is painful—but it's significantly less painful than thinking back on what will never be."[31] The "as could be" self is now out of reach.

The old saying is true: "It's not about being better than someone else, it's about being better than you were the day before."

Effect on Intelligence

A recent study reported in an article entitled, "Watching lots of TV 'makes you stupid,'" confirms dozens of previous studies: screentime damages brain function.

- "The study found people who watch the most TV are twice as likely to have poor mental functioning.
- "Watching TV for hours impairs your mental ability, according to study.
- "It is one of the first studies to demonstrate that watching too much TV encourages cognitive aging, even before middle age."[32]

"Several previous studies have found lower verbal IQ and increased aggressiveness in proportion to the amount of television children watch. This new research uncovers the biological mechanism for these changes in behavior and *drop in intelligence*."[33] As clinical psychologist Dr. Azmaira H. Maker adds, screentime also shrinks the brain and impairs overall cognitive function.[34]

Supported by further research, child psychiatrist Dr. Victoria Dunckley explains that allowing children to be entertained by screens causes underdeveloped brains, atrophy, brain shrinkage, and severed brain connectivity. Screentime literally makes the brain smaller and less connected. It results in children less able to learn, concentrate, form relationships, regulate moods, and causes many other deficiencies in brain activity.[35]

The key to these findings is the mathematical certainty: as hours of watching TV goes up, intelligence goes down.

Similar results were found in a recent American Medical Association study. The study compared preschoolers who get a lot of

screentime with preschoolers who get very little screentime. The preschoolers with a lot of screentime suffered disorganized executive functions and were underdeveloped in language and literacy skills. The deficiencies were shown both in behavioral testing and in MRI brain imaging. The MRIs show startling deficiencies in brain development. The lack of brain development also causes slower processing speed. "'This is the first study to document associations between higher screen use and lower measures of brain structure and skills in preschool-aged kids,' said lead author Dr. John Hutton, a pediatrician and clinical researcher at Cincinnati Children's Hospital." Conversely, reading, juggling, and learning a musical instrument improve the organization and structure of the brain (demonstrated both in behavioral testing and in brain imaging).[36]

The depth and complexity of our damage to brain function is worse than we might expect. Maryanne Wolf, Director of the Center for Reading and Language Research, and Professor of Child Study and Human Development at Tufts University, puts today's screen culture into perspective:

> "The iPad is the new pacifier for babies and toddlers. Younger school-aged children read stories on smartphones; older boys don't read at all, but hunch over video games. Parents and other passengers read on Kindles or skim a flotilla of email and news feeds. Unbeknownst to most of us, an invisible, game-changing transformation links everyone in this picture: the neuronal circuit that underlies the brain's ability to read is subtly, rapidly changing."[37]

Professor Wolf explains that our immersion in the new digital world is undermining "our most important intellectual and affective processes: internalized knowledge, analogical reasoning, and inference; perspective-taking and empathy; critical analysis and the generation of insight."

Dr. Wolf notes a "series of studies which indicate that the 'new norm' in reading is skimming"—thus the "subtle atrophy of critical analysis and empathy," abilities that require slow and deep reading for long periods at a time, in order to develop.

These deficiencies surface in college as "students no longer have the patience to read longer, denser, more difficult texts" and can no longer

"read with a level of critical analysis sufficient to comprehend the complexity of thought and argument."[38]

Further widespread consequences include a decreasing ability in the population to tell the difference between logical or factual statements versus emotive statements that may be false but "ring true" due to strong emotional triggers. This is the inevitable result of a screen culture, and it is today's reality.

This reality is not confined to the US. A 2017 European study shows that "Intelligence levels are falling in advanced industrial countries across Europe."[39] Authors of the report James Flynn and Michael Shayer say the results point to a wider global trend. Perhaps most troubling, is that the worst losses we are now experiencing in the population is at the top. We are losing our best thinkers to the debilitating effects of screentime in our upbringing. As the study notes, "Looming over all is their message that the pool of those who reach the top level of cognitive performance is being decimated: fewer and fewer people attain the formal level at which they can think in terms of abstractions and develop their capacity for deductive logic and systematic planning."[40]

The Dunning-Kruger Effect

The less we know, the more we think we know. As we lose our ability to think, the higher our opinion of our ability to think. As the Dunning-Kruger Effect proved, the less we can logically process information, the more we grossly overestimate our ability to logically process information.[41]

The spiraling descent of competence gains momentum: lower brain function, higher confidence in brain function; worse decision making, greater certainty of good decision making. The Dunning-Kruger Effect—the collapse of accurate self-appraisal—spreads like an intelligence-cancer. We become less smart with every hour, and more convinced that we are smarter than ever.

As David Dunning comments about his Dunning-Kruger experiments, "A whole battery of studies conducted by myself and others have confirmed that people who don't know much about a given set of cognitive, technical, or social skills tend to grossly overestimate their

prowess and performance, whether it's grammar, emotional intelligence, logical reasoning, firearm care and safety, debating, or financial knowledge. College students who hand in exams that will earn them Ds and Fs tend to think their efforts will be worthy of far higher grades; [they] overestimate their competence by a long shot." He highlights the irony: "In many cases, incompetence does not leave people disoriented, perplexed, or cautious. Instead, the incompetent are often blessed with an inappropriate confidence, buoyed by something that feels to them like knowledge."[42]

Confirmation Bias

Confirmation bias and the related tendency of self-segregation are two powerful forces that erode critical thinking. Screentime exacerbates both.

The increase of screentime with smartphones and social media has heightened our susceptibility to "close ranks" socially, a voluntary tendency towards self-segregation. Screenlife makes it easy to exclude people and comments that we don't already believe and love. As *The Death of Expertise* author Tom Nichols observes, "the Internet has politically and intellectually mired millions of Americans in their own biases. Social media outlets such as Facebook amplify this echo chamber." Even if we don't intentionally block what we disagree with, Facebook feeds us what we "like" as part of its service.[43] We segregate from differing people as well as from differing information sources. By replacing social life with social media, we reduce or remove exposure to differing views.

Relying on the Internet for research, news, and information reinforces our mistaken ideas and biases. As author Thomas Friedman says in his book *Thank You for Being Late*, "The Internet is an open sewer of untreated, unfiltered information."[44] There are no signposts to tell us which sites are truly peer-reviewed scientific sources, or rigorous high-caliber journalism; versus poorly substantiated "sciencey" sites, yellow journalism, or flagrant misinformation. Instead of searching for truth, we search to confirm our pre-existing opinions, auto-select sources we like, and hear what we want to hear.

The name for this behavior is *confirmation bias*. "Once we have formed a view, we embrace information that confirms that view while ignoring, or rejecting, information that casts doubt on it.…We pick out those bits of data that make us feel good because they confirm our prejudices."[45] Confirmation bias is operating when we:

- Overlook bad arguments if they support our beliefs
- Ignore faulty logic if we feel good about the conclusions
- Don't bother to investigate an experiment if we agree with the results
- Accept what we like, and reject what we don't like, regardless of the truth.

The Internet, TV, and other screen-media promote confirmation bias, which further segregates society. By definition, confirmation bias means we can always feel right about everything we think. As a result, we stop growing.

"Today, there is a news source for every taste and political view, with the line between journalism and entertainment intentionally obscured to drive ratings and clicks." Furthermore, we choose our sources according to our bias, "people gravitate toward sources whose views they already share."[46] News channels must chase oversimplified political demographics to make money for their advertisers. The media promotes artificial divisions between us, which gradually become real divisions between us. We are molded by what we watch, we segregate ourselves accordingly.

Here we see the vicious cycle of screen-centric news and information:

- Oversimplified biased reporting that promotes hostility and division to woo the "liberal market" or the "conservative market" to generate revenue, instead of neutral objective reporting, which doesn't win ratings or generate revenue.
- Uncritical acceptance (if you already agree) and uncritical rejection (if you already disagree) of the message: confirmation bias.
- Self-perpetuated social segregation.

To use the congressional metaphor, both sides of the aisle are equally guilty of confirmation bias. Studies show that we all (conservatives and liberals alike) reject evidence that upsets our worldview, we "just don't

believe it." To add insult to injury, our worldview today embraces screen devices and screentime as normal (a major cause of confirmation bias). Data showing that screentime damages our mental and physical health is neither welcomed nor heeded. Conservatives and liberals alike will deny science when it challenges their worldview.[47]

This trend will continue to worsen as long as we receive our information from screens. Passively watching the news on a screen makes us much more susceptible to confirmation bias. As shown earlier, TV shuts down the brain's logical-processing and critical-thinking safeguards. We are merely absorbing and feeling, instead of processing and thinking. If the infotainment feels good, then it's true; if it feels bad, then it's false. In today's world of "screenformation" (the re-forming of our minds in the image of the screen), we respond predictably, "I'm right!" In the past world of objective critical thinking, we spoke thoughtfully, "I'll try to understand your opposing view."

Effect on Knowledge Acquisition

Screen-based information gathering drives us further away from knowledge, and further into the illusion of knowledge. Reports showing the trend are increasingly common. "A 2011 University of Chicago study found that America's college graduates 'failed to make significant gains in critical thinking and complex reasoning during their four years of college,' but more worrisome, they 'also failed to develop dispositions associated with civic engagement.' … they were less interested in applying what little they might have learned to their responsibilities as citizens."[48]

Younger people are especially susceptible to the tendency to read uncritically when reading on the Internet. The University College of London (UCL) study found that they typically skim and are not "evaluating information, either for relevance, accuracy or authority. … Internet users tend to … believe whichever results of a search come up first in the rankings, mostly without regard to the origins of those results."

Increasingly, people believe what they see, without regard for the source, as long as it has high search ranking. Clever search-engine

optimization (SEO) now trumps knowledge and truth in the minds of people "reading" on the Internet. The UCL study authors concluded that society is "dumbing down." But it gets worse. Experimental psychologists at Yale found that "'people who search for information on the Web emerge from the process with an inflated sense of how much they know' … This is a kind of electronic version of the Dunning-Kruger Effect, in which the least competent people surfing the web are the least likely to realize that they're not learning anything."[49]

The power of "mindless confidence" on a topic should not be underestimated. Even faced with hard evidence that they are incorrect, people with the illusion of knowledge simply "doubledown" on their false assumptions. People respond to truth by holding tighter to falsehood despite clear indications that they're wrong. This is the increasingly common "backfire effect" when trying to inform someone of something they don't want to know.[50]

Embracing falsehood to protect our feelings is no respecter of political orientation. As recent studies make abundantly clear, "when exposed to scientific research that challenged their views, both liberals and conservatives reacted by doubting the science, rather than themselves." Increasingly people will cling to a comfortable sense of rightness and reject the evidence.[51] (See also the "The Dunning-Kruger Effect" and "Confirmation Bias" sections.)

Our society is fast becoming a prototype Dunning-Kruger experiment, where knowledge is shallow or nonexistent, while our confidence in our rightness is off-the-charts more exaggerated than ever in history. We are raising our children to make every next generation worse than the last. We think we are preparing our children for "today's technological society" by giving them more Internet time in schools and at home. We indulge them with more passive screentime than ever before. The combined effect of video, social media, and Internet "reading" results in generations of ill-equipped young men and women facing a global marketplace that will, in best case, make them suffer and struggle to get up to speed in the employment market, or worst case, crush their hopes and ruin their lives. Prisons and drug rehabs are full of them.

Effect on Creativity

Creativity is measured in many ways. The best comprehensive studies use the of *Torrance Tests of Creative Thinking* (TTCT). Scientific studies over forty years show that there has been a steady decline in children's creativity since 1990, and in related areas since 1984.The current study sampled 272,599 kindergarten through twelfth-grade students and adults.[52] A wide array of creative abilities were tested, including connecting concepts, seeing different angles, as well as imagination and expression:

> "The significant decrease of Strengths scores since 1990 indicates that…children have become less emotionally expressive, less energetic, less talkative and verbally expressive, less humorous, less imaginative, less unconventional, less lively and passionate, less perceptive, less apt to connect seemingly irrelevant things, less synthesizing, and less likely to see things from a different angle."

As communication-through-technology replaces talking person-to-person, our communication becomes more mechanical and impersonal. People are less creative as they grow more dependent on technologies to communicate.

Additionally, the findings show that since 1984:

1) "people of all ages, kindergartners through adults, have been steadily losing their ability to elaborate upon ideas and detailed and reflective thinking;
2) "people are less motivated to be creative; and
3) "creativity is less encouraged by home, school, and society overall."

Given our increasingly screen-centric lifestyles over the past forty years, these findings are not surprising: As everyone in society grows less creative, no one especially notices the decline, or thinks of encouraging a level of creativity that is no longer known.

Today's diminished levels of creativity affect many important areas of our lives. For example, "The results indicate younger children are tending to grow up more narrow-minded, less intellectually curious, and less open to new experiences." People become less accepting of each other, less able to get along, less interested in opposing viewpoints, unable to process multiple sides of an argument, more insulated,

unmotivated when it comes to learning in general. Apply this reality to 300,000,000 people over forty years, and today's realities begin to make perfect sense.

> "The results indicate creative thinking is declining over time among Americans of all ages…. The decline is steady and persistent, from 1990 to present, and ranges across the various components tested by the TTCT. The decline begins in young children, which is especially concerning as it stunts abilities which are supposed to mature over a lifetime."[53]

Another scientific study in 2018, which included a random sample of 40,337 2- to 17-year-old children and adolescents in the US, showed that increased screen use led to loss of curiosity.[54] And yet another study by the National Institutes of Health correlates screentime with lower scores on thinking and language tests.[55]

The most precious abilities are the ones we can develop. For example, IQ cannot be increased by working harder. We're stuck with the IQ we received at birth. But creative abilities are wide open for development and improvement by nurturing and practice. Screentime kills the nurturing and removes the practice. The loss is of special significance for our chances to succeed in life. The study found that "creativity was a better predictor of accomplishments than IQ"—so the drop in creativity hits us where it hurts the most—undermining our future potential.

Effect on Productivity

The past fifty years of increasing screentime leaves us in a cycle of shorter attention spans, weaker concentration, less tolerance for difficult work, and less initiative. The result is the collapse of productivity from an increasingly screen-damaged employment pool.

While US workers put in long hours, we are far from the most productive. "Workers in the US put in more hours than nearly everyone but Koreans" But..."Are Americans the world's most productive employees? Not even close, according to recent research" (based on ratio of GDP to hours worked).[56] Over time, employers and employees alike

begin to expect the appearance of work (long hours), but not the substance of work (productivity).

The American phenomenon of "presenteeism" is that "employees are expected to be at their desks not because there's so much work to be done, but simply to show their dedication to the company. 'Our workplace cultures reward face time, people who get in early and stay late, people who eat at their desk.'" We value long hours instead of high productivity.[57]

In academia and in business, people have to be imported from places where brain function is not yet as undermined by screen culture. This is why China, for example, is quickly growing stronger than the US on every front where there is competition: economic, industrial, academic, technological, and political—American TV-watching is more than double that of the Chinese.[58]

"Our unexpected findings illustrate the secret ingredients of China's economic success, and a serious threat to America's ability to compete in the global marketplace: discipline."[59] This finding focuses on self-management and relationship-management, which require basic building blocks of mental and emotional development lacking in people who grew up watching TV.[60]

Does Content Matter?

Studies into TV in particular show that watching TV itself is the problem. It doesn't matter what we watch. The effortless video experience itself deteriorates brain health, and the drug-like pleasantness of it masks the damage as it's happening. Even educational programming delays the child's development.[61] "Numerous studies have found that the actual act of watching TV is even more dangerous and potentially damaging to the brain of the developing child than what's on TV."[62] Regardless of what's on, TV is bad for us and our children.

In an example from Dr. Marie Winn's *Plug-In Drug* ("Sesame Street Revisited"): "Noting that their negative findings about Sesame Street's value were often met with skepticism or outright disbelief by parents of preschool children, the authors offered a number of explanations for parents' refusal to be persuaded that Sesame Street,

though a delightful entertainment for young children, does not provide them with a particularly valuable learning experience." "The authors also pointed out the favorable press that Sesame Street had received since its inception."[63]

Parental denial of negative findings about a show they like is to be expected—perception of reality for both parents and children alike has been shaped by screen-based values and guidance, which guides us into more screentime.

If a scientific study tells parents that TV is harmful, but a TV publicity campaign tells them that a TV show is good for their kids, parents will reject studies, and believe the TV publicity instead, because it feels better (suggestibility[64]). They deny the science because they like the show. As we saw in the Knowledge section earlier, people increasingly reject science as a rule when it is uncomfortable, or threatens their comfortable sense of "being right."[65]

The false "reality" is being formed in our brains by screens, while our brain cells are made more receptive, so it displaces science and facts with whatever feels right or feels good. In the final blow against good judgment, the lowered brain function of the parents actually promotes gross overestimation of their judgment.[66] No correction needed—everything is fine as it is.

For these reasons, "regardless of the content, television has abetted the creation of an increasingly disempowered people who are not only sedentary and dependent upon professionals to entertain them, but are also complacent and acquiescent to the required advertising necessary to pay for the expensive technologies and equipment."[67]

People are comfortable with the idea that TV is bad only because of bad content. But they remain in denial that the real harm is in the medium itself, and has little to do with the content. Some studies reinforce this misdirection of concern by focusing on content only. They are not proving that the main problem is in the content, they are simply ignoring the effects of screentime, independent of content. "Less attention has been paid to the basic allure of the small screen—the medium, as opposed to the message."[68]

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WHAT'S INSIDE...

Major findings on the effects of screentime from the biological, psychological, physiological, sociological, and behavioral sciences

280 Works Cited for further investigation

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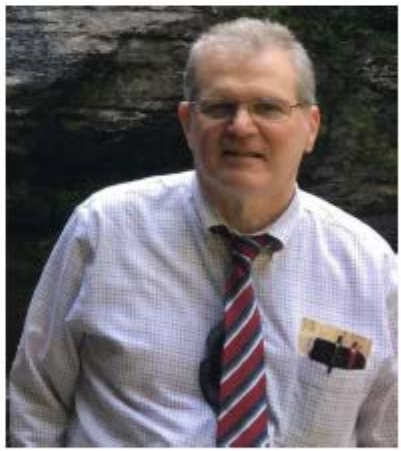

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