

# Economic and Business Dimensions Potential ‘Dark Sides’ of Leisure Technology Use in Youth

*Time for balanced reflections on technology.*

**C**OMPUTING TECHNOLOGY HAS produced many societal benefits. Nevertheless, it often serves as a double-edged sword and promotes negative consequences, such as distraction, addiction, time waste, and reduced well-being.<sup>10</sup> This is perhaps not surprising given that “When you invent the ship, you also invent the shipwreck ... Every technology carries its own negativity, which is invented at the same time as technical progress.”<sup>11</sup> Indeed, many computing technologies follow this pattern, exhibiting a duality of “bright” and “dark” effects on people, firms, and societies.<sup>3,4</sup> The problem is that the understanding of downsides of technology sometimes lags our understanding of upsides. We, especially technology enthusiasts, are often enchanted by the abundant positive things new technologies can do, and this dilutes our ability to develop reliable judgments regarding the harms new technologies can cause.<sup>7</sup>

While studies of both positive<sup>5</sup> and negative<sup>9</sup> technology effects on children and youth exist, trends in technology use among youth and their possible adverse associations are less well explored. It is important to examine and discuss such trends



given the lack of regulation of technology use and the limited awareness to possible technology use harms. By contrast with other harmful materials and behaviors (for example, using illicit substances, consuming junk food, not wearing seatbelts), the use

of computing technologies is largely unregulated and many parents and children may not be aware of the extent of harm that may be associated with excessive use of technology. Hence, analyzing such trends can serve as a springboard for initiating a

healthy discussion in our discipline regarding possible “dark side” effects of computing technologies on youth, and more broadly speaking, developing a more balanced discussion regarding the effects of technologies on societies. Increasing awareness to such issues and sparking this discussion are needed steps before we mobilize resources and develop and test solutions for possible largely unexpected negative effects of technology use on youth.

Here, I seek to shed light on technology use trends in youth and examine their parallels with a range of adverse outcomes in the school, social, well-being, and health domains. To achieve this objective, I analyze a large dataset ( $n=152,172$ ) of survey responses by youth, approximately 13–16 years old, across the U.S. This data is drawn from an annual (2012–2016) survey administered to hundreds of schools.<sup>2</sup>

## Results

Figures 1–4 portray, correspondingly, trends in: time (hours/day) spent on leisure vs. for school computing and work; healthy lifestyle activities; social activities; and well-being and self-worth. Error bars represent 95% confidence intervals.

Figure 1 demonstrates an increase in the use of computing technologies, both for leisure and for school purposes. However, the average increase in technology use for leisure (30 minutes/day) is twice as much as the average increase in the use of technology for school assignments (15 minutes/day). Given the zero-sum-game of a student’s after-school time, one possibility is the use of technologies for leisure purposes is alluring and consequently cannibalizes from schoolwork time (average reduction of 11.4 minutes/day between 2012 and 2016). Another possibility is the changes in the use of technology for schoolwork increases efficiency in homework tasks; but the nature of such potential efficiencies (for example, increased ease of finding explanations vs. increased ease of finding an online solution to copy) is unclear.

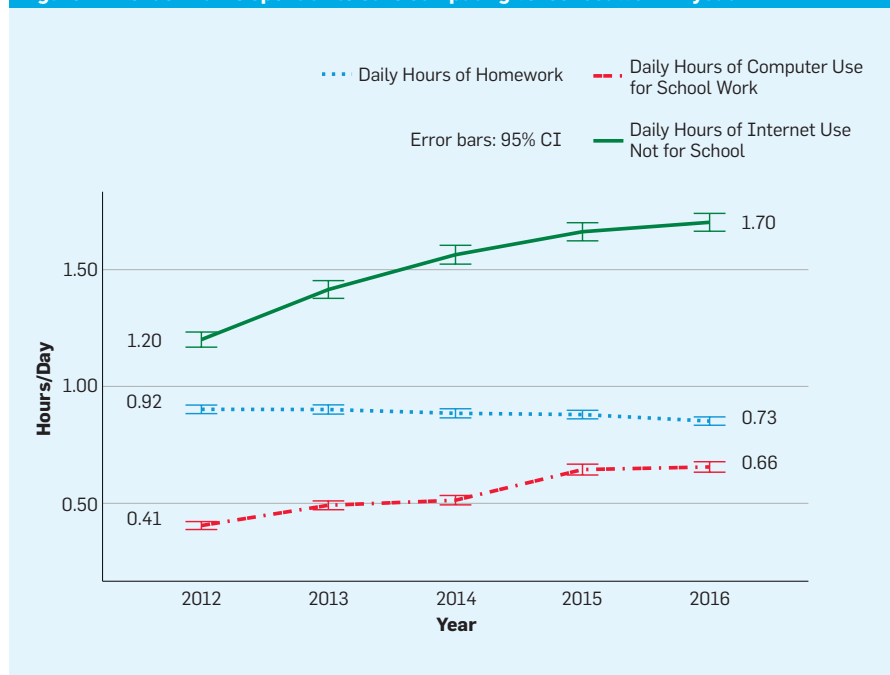
Figure 2 shows the changes in technology use patterns described in Figure

1 parallel a decline in the frequency of important healthy lifestyle activities, including eating breakfast, exercising, and getting sufficient sleep. Again, this might be explained via the zero-sum-game argument; the use of alluring technologies might have cannibalized from healthy lifestyle activities. For instance, video gaming can consume people’s time and prevent physical activity; it can also reduce sleep via the blue light emitted from screens.<sup>8</sup>

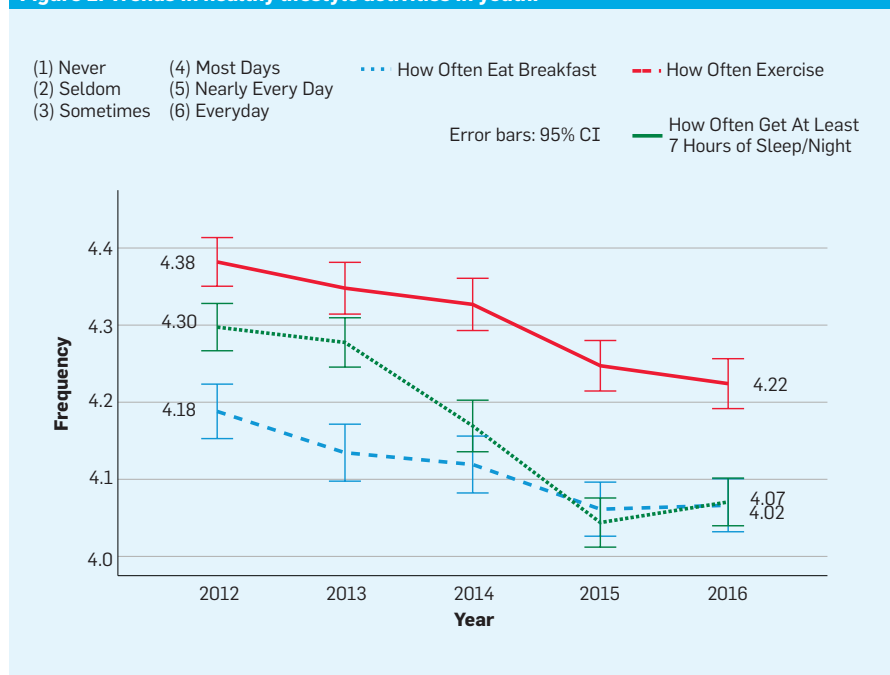
Moreover, in many cases young video gamers deceive their parents and play late at night or early in the morning,<sup>1</sup> which can explain reduction in breakfast frequency.

Figure 3 shows a decline in face-to-face social activities in youth that parallels the increase in the use of leisure technologies. Circa 2016, youth attended social functions, met friends, and went on dates less frequently compared to 2012 youth. Technology can

**Figure 1. Trends in time spent on leisure computing vs. school work in youth.**



**Figure 2. Trends in healthy lifestyle activities in youth.**



serve as one explanation for this decline as it can isolate youth, build on-line socialization habits, and reduce youth's motivation and ability to interact face-to-face.<sup>10,12</sup>

Lastly, Figure 4 demonstrates a general decline in well-being and self-worth perceptions that parallels the increase in leisure technology use. This can be explained via the increase in use of social media, where everyone else's life seems perfect. Social media

users are exposed to a larger comparison set. If a child is comparing him- or herself to the top people of an ever-expanding set, then it is conceivable that he or she might experience a growing inferiority complex.

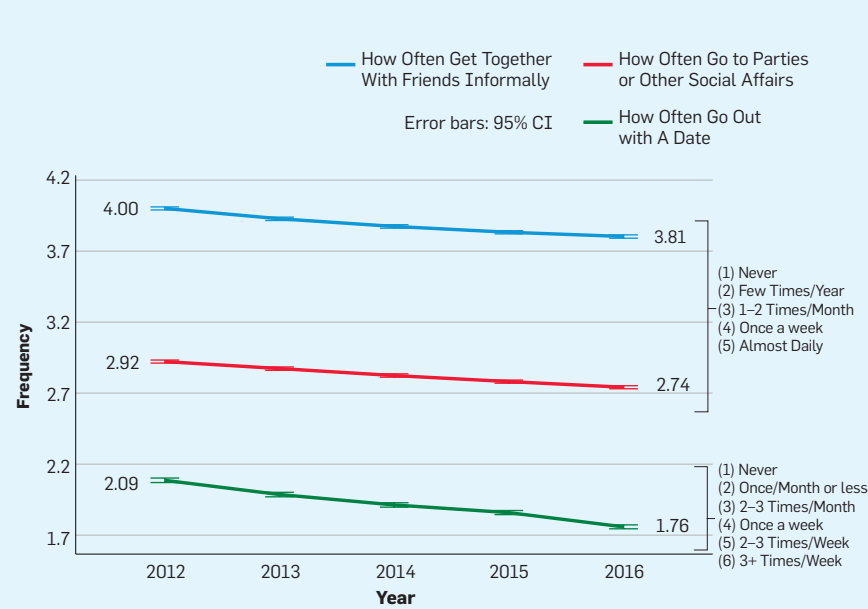
The parallels between these groups of trends can of course be a coincidence. However, it is also possible that, as per the many studies indicating possible negative effects of technologies on adults and young

adults,<sup>4,7,10</sup> the sometimes excessive use of leisure technologies in youth can adversely affect school, social, health and well-being facets. While I could not calculate all correlation given the nature of the dataset, existing correlations provide some support for these claims. The hours/day of use of the Internet for leisure purposes was significantly negatively correlated with the frequency of meeting friends informally, face-to-face ( $r = -0.025$ ), and with attending social functions ( $r = -0.010$ ). Thus, it can be viewed as a correlate of reduction in face-to-face social activities. The use of leisure technologies was also positively correlated with the use of technology for school work ( $r = 0.198$ ). Thus, it is possible that encouraging youth to use technology for school work backfires, as the mere presence of a computer may allure them to spend more leisure time on the Internet. Note the relatively small correlations imply the use of technology for leisure purposes may not be the only or prime cause for adverse outcomes in the social domain, but it may be viewed as a potentially contributing factor for such issues.

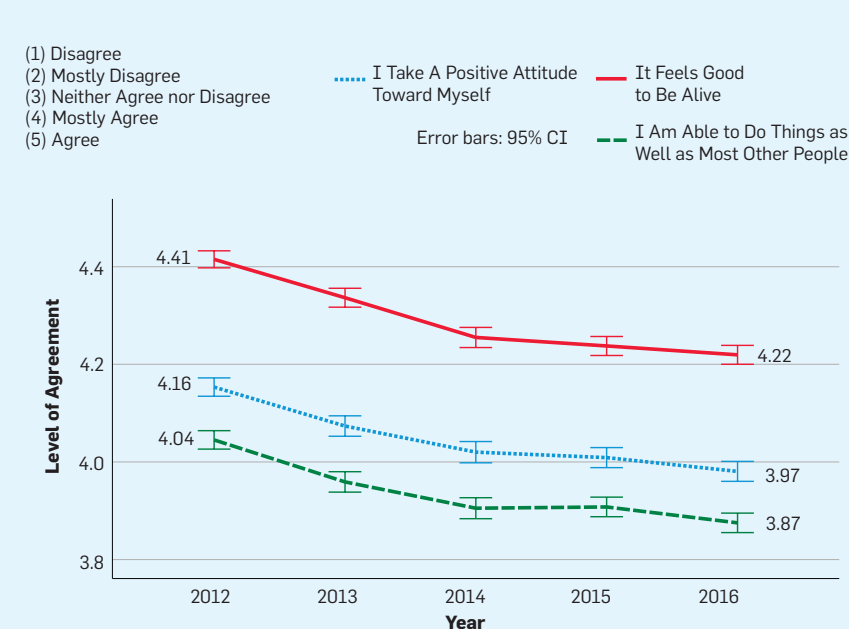
### Time for Balanced Reflections on Technology

For many years we have emphasized the positive aspects of computing technologies because we believed in their contribution to humanity. Nevertheless, there is a growing body of evidence in support of a technology duality view. That is to say, we have started realizing and quantifying the notion that many of the technologies we develop can also be harmful, especially when used excessively. While adults can typically understand and deal with such issues, for example, through self-regulation of leisure technology use during work hours, youth often cannot do so as effectively. This difference stems from the idea that their brains are still developing, and the parts of the brain that drive rewarding behaviors develop faster than their brain regions that are involved in self-control.<sup>6</sup> It is hence our responsibility to better inform them, their families, and their educators regarding possible risks that may be associated with improper and excessive use of leisure computing technologies. We

**Figure 3. Trends in social activities in youth.**



**Figure 4. Trends in well-being and self-worth in youth.**




## Many of the technologies we develop can also be harmful, especially when used excessively.

should also consider whether the leisure computing technologies we develop should allow users to: easily self-track own activity; inform young users and parents when dangerous levels of activity are reached; and restrict/block activities by request.

It is informative to reflect on parallels between our industry (the tech-sector) and other industries that revealed “dark sides” after a period of focusing almost solely on positive aspects of their products. Two industries that come to mind are the tobacco and food industries. The tobacco industry sold its products and emphasized their positive effects (for example, increased concentration) while hiding its negative effects. Court rulings have forced it to pay restitution, and regulations have forced it to restrict the use of tobacco products to adults, and to advertise the risks associated with its use. Consequently, there has been a constant decline in tobacco consumption in Western countries.

Perhaps this is an extreme parallel, because one can argue that people can live without tobacco, but technology is essential to functioning in modern society. If so, consider the food industry parallel. On an evolutionary time-scale, food was scarce so people developed innate preference for fatty and sugary foods. Modern ability to satiate these needs has improved and companies have created many such foods to the point where unhealthy food is abundant and obesity became an epidemic. Governments regulate food by enforcing food labeling as a means to inform consumers. Simultaneously, awareness regarding proper nutrition has increased. The responsibility

for possible overconsumption, in this case, lies with parents, educators, and children. Adapting this view, we could argue for increasing awareness regarding leisure technology use risks and at the same time ask the developers of such technologies to either voluntarily or through government regulation provide people with the means to track use and to have more usage control and self-monitoring. This is, for example, exactly what Apple has done with iOS 12. Still, we cannot solely count on tech providers; the responsibility to inform our children regarding such risks and to teach them to live responsibly with technology is likely still ours. As a discipline, we certainly must start developing a balanced discussion that acknowledges both possible positive and negative effects of technology on children and young adults. 

### References

1. Bruner, O. and Bruner, K. *Playstation Nation: Protect Your Child from Video Game Addiction*. Hachette Book Group, NY, 2006.
2. Johnston, L.D. et al. *Monitoring the Future: A Continuing Study of American Youth (8<sup>th</sup>- and 10<sup>th</sup>-Grade Surveys)*, 2015. Research, I.f.S. Ed., Inter-university Consortium for Political and Social Research (ICPSR), Ann Arbor, MI, 2016.
3. Malhotra, A. and Van Alstyne, M. The dark side of the sharing economy ... and how to lighten it. *Commun. ACM* 57, 11 (Nov. 2014), 24–27.
4. Tarafdar, M. et al. The dark side of information technology. *MIT Sloan Management Review* 56, 2 (Winter 2015), 600–623.
5. Turel, O. and Bechara, A. Little video-gaming in adolescents can be protective, but too much is associated with increased substance use. *Substance Use and Misuse*. (Jan. 2019); DOI: 10.1080/10826084.2018.1496455
6. Turel, O. et al. An examination of neural systems subserving Facebook “addiction.” *Psychological Reports* 115, 3 (Mar. 2014), 675–695.
7. Turel, O. and Qahri-Saremi, H. Problematic use of social networking sites: Antecedents and consequence from a dual system theory perspective. *Journal of Management Information Systems* 33, 4 (Apr. 2016), 1087–1116.
8. Turel, O., Romashkin, A., and Morrison, K.M. Health outcomes of information system use lifestyles among adolescents: Videogame addiction, sleep curtailment and cardio-metabolic deficiencies. *PLoS One* 11, 5 (May 2016), e0154764.
9. Turel, O., Romashkin, A., and Morrison, K.M. A model linking video gaming, sleep quality, sweet drinks consumption and obesity among children and youth. *Clinical Obesity* 7, 4 (Apr. 2017), 191–198.
10. Turel, O. and Serenko, A. The benefits and dangers of enjoyment with social networking websites. *European Journal of Information Systems* 21, 5 (May 2012), 512–528.
11. Virilio, P. and Petit, P. *Politics of the Very Worst*. Semiotext(e), NY, 1999.
12. Xu, Z.C., Turel, O. and Yuan, Y.F. Online game addiction among adolescents: Motivation and prevention factors. *European Journal of Information Systems* 21, 3 (Mar. 2012), 321–340.

**Ofir Turel** (oturel@fullerton.edu) is a professor of Information Systems and Decision Sciences at California State University, Fullerton, and a scholar in residence at the decision neuroscience lab at the University of Southern California; <http://oturel1.wixsite.com/ofirturel>

Copyright held by author.

## Coming Next Month in COMMUNICATIONS

**A Special Special on the Europe Region**

**Understanding Trends in the Use of Various Analytics Applications for Managerial Work**

**Cyber Security in the Quantum Era**

**Neural Algorithms and Computing Beyond Moore’s Law**

**Metrics that Matter**

**Identity By Any Other Name**

**Research for Practice: Edge Computing**

**The Web Is Missing an Essential Part**

**Fully Device-Independent Quantum Key Distribution**

**Plus the latest news about non-standard robot designs, the future of data storage, and employee monitoring.**