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Smartphones are bad for some adolescents, not all

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Last year, I received a phone call from an angry father. He had just read in the newspaper about my research suggesting that some adolescents might benefit from time spent online. Once, he raged, his children were fully engaged with family and church and had talked non-stop at meal times. Now, as adolescents constantly connected to their phones, they had disappeared into their online lives.

He is not alone in his concern. Increasingly, people are claiming that smartphones have destroyed a generation, or that they might be making adolescents lonely and depressed. After ten years of tracking adolescents' mental health and use of smartphones, I think that such views are misguided. Most young people aged 11–19 (ages vary between studies) are doing well in the digital age. In the United States, a record 84% of students graduated from high school in 2016. Pregnancy, violence, alcohol abuse and smoking have all declined in teenagers in the past 20 years. Similar trends have been observed in other countries.[1]

More and better data are crucial. But studies so far do not support fears that digital devices are driving the downfall of a generation. What online activities might be doing, however, is reflecting and even worsening existing vulnerabilities.

Smartphone generation

In the United States, ownership of mobile phones begins early. My colleagues and I surveyed 2,100 children attending public schools in North Carolina in 2015. In that sample, which is likely to be representative of US adolescents, 48% of 11-year-olds told us they owned a mobile phone. Among 14-year-olds, it was 85% (see Odgers et al data posted here: go.nature.com/2eeffku).

Another survey, done in the same year, indicates that on average, US teens aged 13–18 engage with screen media (from watching television or online videos to reading online and using social media) for more than 6.5 hours each day; mobile devices account for almost half this time.[2] Ownership and usage is also high elsewhere: in a 2014 survey of 9- to 16-year-olds in 7 European countries, 46% owned smartphones.[3]

Alongside this increase in the use of digital technology, young people are taking more time to move between childhood and adulthood. Since the 1960s, young people have been

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delaying social-role transitions such as marriage, childbearing and taking full-time employment.[4]

There is also some evidence for an increase in mental-health problems among adolescents. The percentage of US girls aged 12–17 reporting depressive episodes increased by more than 4 percentage points between 2005 and 2014, to 17.3%. The proportion of boys doing so in 2014 was 5.7%, a rise of 1.2 percentage points since 2005.[5] Since 1999, the US suicide rate has also increased for every age group, with the most marked rise among adolescent girls.[6] Similar trends among young girls have been observed elsewhere.[7]

Various commentators have suggested that young people's rapidly increasing use of digital technologies is accelerating or even driving these behavioural shifts and mental-health trends. In fact, last month, investors released an open letter demanding that technology giant Apple respond to what they see as a "growing body of evidence" detailing the negative consequences of digital devices and social media among young people.

Pros and cons

What do the data show?

In the 1990s and early 2000s, US surveys showed that adolescents who reported spending more time online were more likely to also report symptoms of depression and anxiety8. But back then, a fraction of adolescents were online — only 14% of the US adult population had access to the Internet in 1995 — and most spent time playing games or talking to strangers in chat rooms. Today, more than 90% of US adolescents are online daily, and much of their time is spent connecting with friends and family whom they share their offline lives with.

A handful of more recent studies, mainly involving university students, not adolescents, have probed for correlations between people's mental health and their use of digital technologies. These have generated a mix of positive, negative and null findings, all with minuscule effect sizes. One of the largest studies so far looked at more than 120,000 UK adolescents in 2017. It found no association between mental well-being and "moderate" use of digital technology, and reported measurable, "albeit small" negative associations for people who had "high levels" of engagement.[9]

Meanwhile, a growing body of research conducted over the past decade suggests that time online can actually benefit young people.

A review of 36 studies published between 2002 and 2017 indicates that teens use digital communication to enhance relationships by sharing intimacy, displaying affection and arranging meet-ups and activities.[10] A 2009 longitudinal study of more than 1,300 children and teens also showed that children aged 6–12 who had higher-quality social relationships (defined according to caregivers' descriptions of the children's relationships with friends, caregivers, siblings and teachers) became more-frequent users of e-mail, chats or instant messaging as adolescents aged 12–18. Their offline friendships as adolescents were also more cohesive, as judged by their own descriptions.[11]

Experimental studies, in which subjects play computer games in the lab, have shown that virtual communication (texting a peer they didn't previously know, say) can help adolescents to 'bounce back' after social rejection[12] — such as being excluded from a game with multiple players.

What the data also suggest, however, is that young people from different socio-economic backgrounds are having very different experiences online. US teens aged 13–18 from families whose total income is less than US$35,000 per year spend, on average, around 4 hours a day watching television and online videos. That's around twice as much time as that spent by their peers from households that have incomes of more than $100,000 per year.[2] In total, low-income teens spend about three hours more each day engaging with screens.

The 2014 study of 3,500 children aged 9–16 from 7 countries in Europe showed that parents in wealthier homes are more likely to "actively mediate" what their child does online. This might be by talking about it, suggesting ways to use the Internet more safely, or joining in and playing computer games, viewing videos or posting alongside their children.[3]

In general, the adolescents who encounter more adversity in their offline lives seem most likely to experience the negative effects of using smartphones and other digital devices.

In our 2015 North Carolina survey, teens from low-income families were more likely than more-affluent peers to report that their experiences on social media resulted in offline physical fights, face-to-face confrontations, or them getting into trouble at school (see 'Figure 1"). Adolescents who have a history of victimization are more likely to be bullied, solicited and victimized online.[13] Those with behavioural problems, such as difficulties concentrating in class, or a propensity to get into fights, tend to experience more problems on days when they use digital technology more heavily.[8]

Other studies conducted over the past decade indicate that adolescents struggling in their offline lives are more likely to have negative online experiences.[14] For example, already-vulnerable young people are more likely to receive negative feedback on social media, experience difficulties regulating their use of the Internet and spend more time 'lurking' — passively viewing others online, rather than actively engaging with them.[15]

The 'digital divide' has conventionally referred to differential access to new technologies. That gap still exists, but is shrinking in many countries.[16] In our 2015 survey, 92% of adolescents aged 10–15 from economically disadvantaged homes had access to the Internet, compared with 97% of other teens of the same age. And 65% of those from disadvantaged homes owned a mobile device, compared with 69% of their peers.

What we are seeing now might be the emergence of a new kind of digital divide, in which differences in online experiences are amplifying risks among already-vulnerable adolescents.

Explore inequalities

Some might counter that digital technologies are simply providing a fresh medium for the expression of existing problems. They could be right. But given the patterns emerging, it is crucial to investigate thoroughly whether and how the online experiences of adolescents worsen existing inequalities. We must also invest in evidence-based ways to ensure that online experiences are positive for all young people.

This will require advances on several fronts, including the design of rigorous experimental studies. These are challenging because of the difficulty of obtaining control groups — adolescents who are offline or who are willing to have their phones taken away.

One possibility is for researchers to home in on the transition period — when young people first begin to have regular access to mobile devices and social media. Indeed, mobile devices are hugely enabling when conducting research and randomized control trials focused on behaviour and mental health in young people.

Mental states can be gleaned directly from reported information, or indirectly — from data on sleep patterns collected by a wearable device, from entries on Facebook or Twitter, or even from how people text.

Computer scientists, for instance, have predicted the onset of depression from social-media posts and engagement patterns.[17] Also, mobile technologies can be used to deliver ‘just-in-time’ interventions and support. A 2016 meta-analysis found that brief interventions, such as computer-assisted cognitive behavioural therapy delivered through mobile devices, improved people’s psychological well-being and reduced reported symptoms of depression and anxiety.[18]

Experimental rigour demands common research protocols, such as standardized questionnaires for assessing online usage and experiences across multiple contexts. The Global Kids Online research toolkit is an excellent example. But such protocols need to be made available in a way that would allow investigators to update them continually, to capture adolescents’ evolving digital habits and environments.

The data obtained so far call for other changes, too. Neuroscientists, psychologists and paediatricians need to join forces with those working on human–computer interactions. The Jacobs Foundation 2015 conference on Technologies for Research and Intervention with Children and Youth concentrated on building these types of interdisciplinary partnership. Many more of these types of opportunities are needed.

Until a stronger evidence base is built, those who care about the healthy development of adolescents must keep questioning powerful narratives about the next generation. These can blind parents, educators and others to the potential benefits of new technologies for this age group, or, worse, cause the real determinants of mental health and other problems to be missed.

A 2017 petition published in The Guardian newspaper called for policies based on evidence, not fear, and was signed by more than 80 scientists (myself included). It offered some pushback against a predominantly one-sided conversation in the media. More crucial is informed and evidence-based dialogue between educators, health professionals, parents, researchers and adolescents.

Offline risk predicts online problems

Because online problems can be predicted by young people's vulnerabilities offline, much of our existing knowledge about what promotes healthy child development is applicable even in what seems like a foreign digital landscape. Strategies such as the maintenance of supportive parent–child relationships that encourage disclosure, parental involvement in the activities of their children, and the avoidance of overly restrictive or coercive monitoring will help to support adolescents and keep them safe online, just as they do offline.

Leading professional organizations, such as the European Association for Research on Adolescence, the World Economic Forum and the Society for Research in Child Development, could provide important leadership in this regard. Finally, partnerships between local governments, technology companies and educational institutions are key to ensuring that young people, including the most vulnerable, have equal opportunities online.

Social-media sites offer basic protections for adolescent users by providing information to caregivers. But most safety protocols rely on parental advocacy and active mediation and management of online activities, which might leave the most vulnerable young people unprotected.

In December 2017, Facebook pledged $1 million in research funds to help better understand the "relationship between media technologies, youth development and well-being". The best use of such funding could be the development of tools, screening algorithms and outreach strategies for the most vulnerable adolescents. For instance, machine learning and clinical expertise could be leveraged to build classifiers that predict current and future mental-health problems, and such screening algorithms could be used alongside 'just-in-time' interventions.

As Facebook is learning from its recent application of artificial-intelligence approaches to screening for suicide risk, this is not a simple problem. But it is a challenge that technology companies, computer scientists and psychologists are well positioned to take on.

Adults worry about how adolescents spend their time. The telephone, rock 'n' roll, comic books and romance novels all elicited panic. As a parent, I am sympathetic. One in three Internet users worldwide is a child, and the explosion of algorithmically selected content in particular raises legitimate concerns about responsibility and agency.

Yet the design of a digital world that is safe, inclusive, stimulating and nurturing for all requires that we resist fear-based reactions. Instead, we must use the data to understand the very different experiences that young people from diverse backgrounds are having online.

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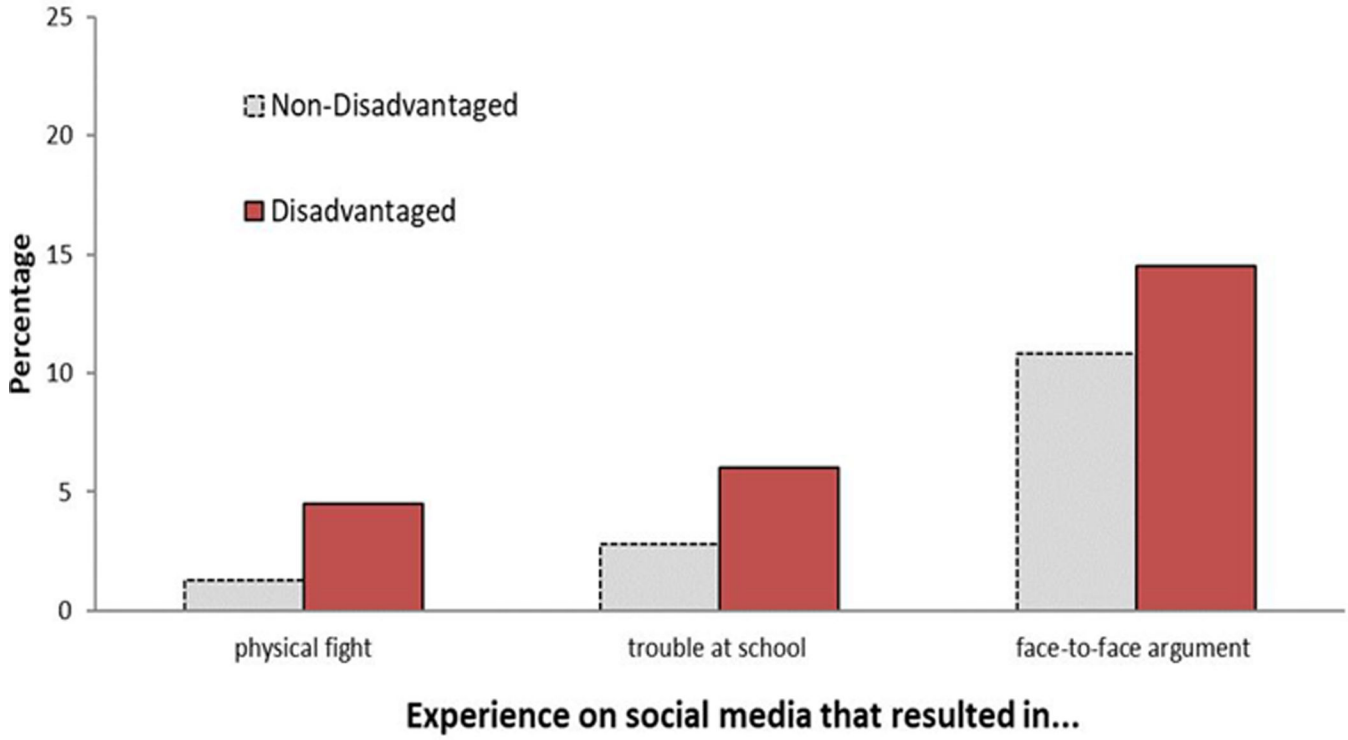

Figure 1.
Social Media Spill Over
Note: *Economically disadvantaged* is defined based on whether the family was eligible for the receipt of free and/or reduced lunch using school administrative records. Schools use verified household income to determine eligibility; cutoffs vary with household size and are on the order of 175% the US federal poverty level.