



Discussing digital technology overuse in children and adolescents during the COVID-19 pandemic and beyond: On the importance of considering Affective Neuroscience Theory

Christian Montag^{a,*}, Jon D. Elhai^b

^a Department of Molecular Psychology, Institute of Psychology and Education, Ulm University, Ulm, Germany

^b Department of Psychology, and Department of Psychiatry, University of Toledo, Toledo, OH, USA

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ABSTRACT

Introduction: During the 2020 COVID-19 pandemic and associated lockdown/social distancing, many scientists pointed towards the problem of increased digital technology overuse in both children and adolescents.

Methods: Although a review of the literature shows that digital technology overuse in youth represents an important topic to be studied itself (during the pandemic and afterwards), the present work also takes into account findings from Affective Neuroscience Theory (ANT).

Results: An investigation of digital overuse while the COVID-19 pandemic (and beyond) against the background of ANT calls for a shift of perspective in research, at least as an important supplement to research efforts querying the actual nature of digital overuse. In the present work, we argue that it is high time to more comprehensively address why children spend too much time with screens and to also highlight the *indirect* media effects of screen time use (e.g. less mammalian rough and tumble PLAY time outside and elevated SADNESS due to parental neglect).

Conclusions: In sum, insights from ANT are put forward to guide research shedding light on detrimental aspects of too much screen time in youth.

The 2020 COVID-19 pandemic has resulted in a global lockdown/social distancing with unforeseeable adverse consequences for the global economy, but also mental health problems, itself causing financial burdens for society (Altig et al., 2020; Nicola et al., 2020; Pfefferbaum & North, 2020). Among the many problem-areas discussed in the realm of the pandemic, a growing number of scientists point towards the problem of digital technology overuse (Eidi & Delam, 2020; Király et al., 2020). To illustrate this problem with new estimates, a nationwide survey from China (Sun et al., 2020) observed that 46.8% of N = 6416 participants reported increased tendencies towards overuse of the internet as a consequence of the pandemic. Moreover, due to the global lockdown 1.5 billion children have been estimated to stay at home at the end of April 2020 (WHO, 2020). During this period, youth have been more vulnerable to spend excessive time in front of screens including digital tablets, smartphones, desktop computers and TV. According to a new study with data from Germany 10–17 year-old children/adolescents who reported gaming at least once each week played about 138.6

min of video games on a work day four weeks after lockdown initiation compared to about 79.2 min in September 2019 before the pandemic (DAK-Studie, 2020; this study also presented numbers on elevated social media use during the pandemic). Although gaming playtime in itself is not sufficient to diagnose a condition such as Gaming Disorder or related problems in the digital realm (Montag, Schivinski, et al., 2019; Pontes et al., 2019), the estimates show that overuse of digital technologies represents a likely phenomenon and outcome of the COVID-19 pandemic.

Although discussion about the actual nature of digital screen-time overuse is still a matter of debate (Montag, Wegmann, Sariyska, Demetrovics, & Brand, 2019; Panova & Carbonell, 2018), we point to an often overseen but simple fact, which needs to be more strongly considered, when detrimental aspects of screen-time are discussed. Although use of (digital) media in itself without doubt can have *direct* adverse consequences (e.g. by consumption of violent media content, experiencing of cyberbullying or negative affect often accompanying

* Corresponding author at: Department of Molecular Psychology, Institute of Psychology and Education, Ulm University, Helmholtzstraße 8/1, 89081 Ulm, Germany.

E-mail address: christian.montag@uni-ulm.de (C. Montag).

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excessive usage), the often neglected *indirect media effects* should not be overseen. We believe this not only to be true for the scientific community, but also for policy makers around the world. This is in particular true, because for the youngest individuals – children – the great lockdown went along with dramatic restrictions regarding the fulfillment of inner urges such as sufficient outdoor play time.

In this context it is of particular interest to acknowledge our mammalian heritage: The prominent Affective Neuroscience Theory (Panksepp, 1998; for a short introduction see Davis & Montag, 2019) proposed that seven primary emotional systems have been homologously conserved across the mammalian brain. These phylogenetically old systems function as tools for survival and endow mammalian species with important brain systems to successfully interact with the environment. On the positive side of these ancient emotions the SEEKING, CARE, LUST and PLAY circuits need to be mentioned, whereas on the negative side of emotions the FEAR, SADNESS and ANGER systems have been mapped in detail with methods such as deep brain stimulation, pharmacological challenges and lesion studies (Montag & Panksepp, 2017).¹ In childhood, in particular the SEEKING system arising from the medial forebrain bundle helps children to engage with the world and the PLAY circuit among others ensures that children learn to socially interact with other humans. Stimulation of these neural circuits goes along with positive emotions (reinforcing this kind of positive behavior), whereas the pandemic restricted the experience of SEEKING and PLAY activities. Instead the COVID-19 pandemic likely overstimulated the SADNESS (and FEAR) systems in many children with detrimental effects on child development. To illustrate this more: In many households it has been observed that both parents needed to work, while daycare for children was unavailable. As a consequence many children spent more time without guidance from their parents or guardians and they likely not only experienced a lack of CARE but also more SADNESS due to neglect (e.g., mirroring in more depressed symptoms; see Duan et al., 2020). For some children this kind of neglect likely also led to irritated behavior and ANGER responses. Of notice, neglect also happens outside the pandemic when caretakers themselves are constantly distracted by digital technologies and paying less attention to their offspring while making a family trip to a museum, having a meal at a fast food restaurant or being on a playground (Kushlev & Dunn, 2019; Radesky et al., 2014; Wolfers, Kitzmann, Sauer, & Sommer, 2020).

During the COVID-19 pandemic, in some households children likely also witnessed or experienced more violence (ANGER on the caretaker side triggering FEAR in children), something at least discussed in many opinion papers (Bradbury-Jones and Isham, 2020; Usher, Bhullar, Durkin, Gyamfi, & Jackson, 2020). New empirical evidence backs this up by showing that in particular parents with more anxiety and depressive symptoms tend to show more potential for child abuse perpetration during the pandemic, especially when not receiving support (Brown, Doom, Lechuga-Peña, Watamura, & Koppels, 2020). Fear of COVID-19 might also have played a part in this, as higher Fear of COVID-19 seems not only closely associated with higher tendencies towards anxiety and depressive symptoms, but also perceived vulnerability to disease (Ahorsu et al., 2020). Moreover, Fear of COVID-19 easily could have spilled over from the caretakers to their children. In sum, not only the mammalian SADNESS system, but also the FEAR system of children might have been overstimulated in times of the pandemic (which is still on-going while writing this review/opinion). Please see for a summary also Fig. 1.

Beyond that one of the most important – also genetically – anchored urges (Montag et al., 2016) in childhood has been under-stimulated in millions of children around the globe at least in times beginning with the lockdown, but also in general when they excessively spend their time in

front of screens. For example, in Spain and Italy, families including their children had to stay at home for several weeks without being able to go outside. As a consequence, children had no chance to follow their inner mammalian urge to PLAY. As mentioned earlier, rough and tumble PLAY is of utmost importance to develop social competencies and motor skills. A leading neuroscientist even proposed that more play sanctuaries might be helpful to reduce the problem of ADHD (Panksepp, 2008), a mental disorder often accompanying tendencies towards overuse of the internet (Yen, Ko, Yen, Wu, & Yang, 2007; Sariyska, Reuter, Lachmann, & Montag, 2015). Therefore, blocking playgrounds likely represented the wrong strategy to fight the pandemic (e.g. in Germany), because children were deprived of valuable PLAY time (and in the meantime we know that due to aerosols COVID-19 spreads more inside closed rooms than outdoors; e.g. (Casella, Rajnik, Cuomo, Dulebohn, & Di Napoli, 2020)).

In sum, we believe that it is time to shift the focus of research and discussion a bit from just pointing to excessive screen-time as the problem behavior in childhood/adolescence, also being characterized by continued digital use despite detrimental effects on young lives. Instead, we must ask *why* too much screen-time occurs (in the pandemic due to parental neglect with a myriad of causes, and children coping with their negative affect) and we need to take into account the consequence of PLAY deprivation (an indirect media effect), which could itself cause manifold detrimental consequences – ranging from ADHD to lower empathic skills (Lachmann et al., 2018; Melchers, Li, Chen, Zhang, & Montag, 2015; Sariyska et al., 2015); see for a detailed discussion in (Montag & Davis, 2020)). Of importance this area needs much work to establish causality between these variables and to obtain effect size estimates. Despite this critique, new longitudinal work by (Zhou, Zhang, Li, Xue, & Zhang-James, 2020) suggests that greater ADHD tendencies result in greater tendencies towards excessive use of the internet and not the other way round. Yet, a review work by (Anderson, Steen, & Stavropoulos, 2017) clearly stated based on empirical evidence that, “the relationship between mental health and PIU² appears to be bi-directional, as although poor mental health can be a strong precursor to PIU, studies have also found that PIU can predict poor mental health” (p. 446). This said, some screen-time will be necessary and important: in particular in times of the lockdown (and clearly also in times out of the pandemic), computers and tablets provide children and adolescents the chance to learn and interact with their teachers. But as often in life, it is important to find the right balance and find a valid/reliable way to monitor and assess detrimental aspects of children’s behavior (e.g. monitoring decline of school grades, but also paying close attention to mood swings and irritable behavior starting with children at a younger age). Without the right balance, excessive screen time might result in the aforementioned psychopathological states (again see for problems with causality). On the contrary, nourishing young brains with CAREing behavior from the caretakers – together with enough PLAY and SEEKING time – will help to foster prosocial skills in young ones and mental health.

We believe that an Affective Neuroscience Theory view on our mammalian heritage helps to better understand the consequences of the COVID-19 pandemic for children, adolescents, but also adults, and adds an important perspective to find the right kind of balance between spending time in front of digital screens and the genetic need to follow the inner urge to PLAY and explore the world (SEEKING), while being safe and sound (absence of FEAR, ANGER and SADNESS). Furthermore, the present theoretical model also makes suggestions on how to reduce problems of too much screen time in children/adolescents during the pandemic and in general. While the pandemic is ongoing, clearly financial support from governments (such as provided in Germany) can lessen the financial burden among families and caretakers, allowing adequate time to care for their offspring in times of crisis. Moreover, the theoretical model makes clear that children not only need to be taken

¹ Please note, that all mammalian primary emotional systems are written in capitals to not confound them with same sounding terms in the psychological and neuroscientific literature.

² problematic internet use.

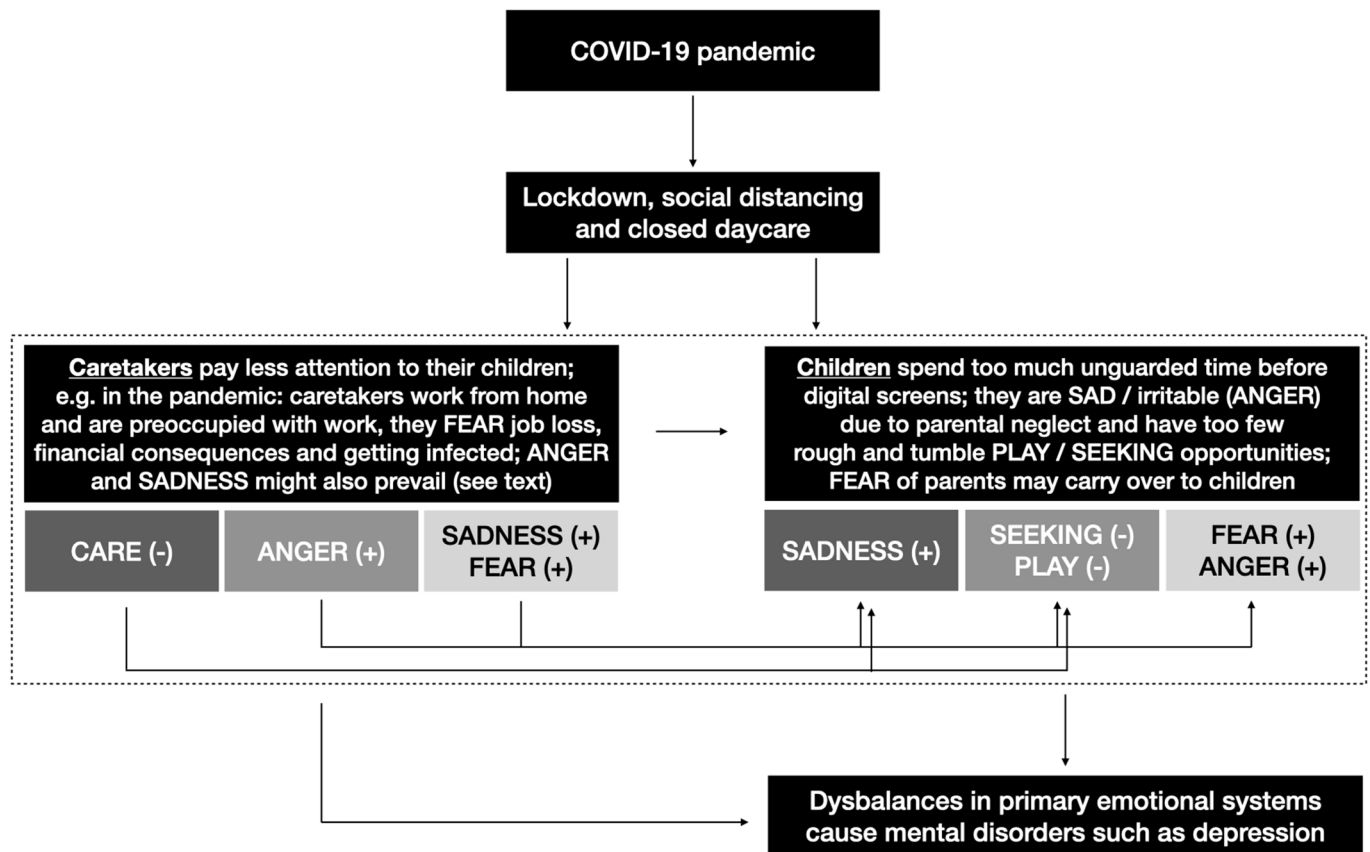


Fig. 1. COVID-19 countermeasures led to closed daycare and working from home, along with a greater likelihood of childhood neglect (and unmet inner needs such as PLAY and SEEKING activities).

CARE of, but they need also enough time for rough and tumble PLAY and exploring the world (SEEKING), even when a pandemic such as COVID-19 is ongoing. Safe PLAY sanctuaries are therefore of utmost importance to foster well-being in childhood to make sure that they grow up into mental healthy adolescents and adults.

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