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8   IN THE UNITED STATES DISTRICT COURT

9   FOR THE NORTHERN DISTRICT OF CALIFORNIA

10   SAN JOSE DIVISION

11

12

13 **NETCHOICE, LLC d/b/a NetChoice,**   5:22-cv-08861

    Plaintiff,
14   **DECLARATION OF JENNY S.**
                                                RADESKY, MD IN SUPPORT OF
        v.   **DEFENDANT'S OPPOSITION TO**
15   **PLAINTIFF'S MOTION FOR**
                                                PRELIMINARY INJUNCTION
16 **ROB BONTA, ATTORNEY GENERAL OF**
    THE STATE OF CALIFORNIA, in his
    official capacity,
17
    Defendant.
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I, Jenny S. Radesky, MD, declare and state as follows:

1.   I submit this declaration in support of Defendant's Opposition to Plaintiff's Motion for Preliminary Injunction.

BACKGROUND & QUALIFICATIONS

1.   I am a tenured Associate Professor of Pediatrics and Director of the Division of Developmental Behavioral Pediatrics at University of Michigan Medical School and C.S. Mott Children's Hospital. In this role, I lead a team of 10 clinicians and researchers who aim to understand, treat, and advocate for children's developmental, emotional, and educational needs. This work requires theoretical and practical knowledge about child development, parent-child relationships, and the ways children's individual differences – such as self-regulation, executive functioning, literacy and language processing, trauma exposure, or attachment insecurity – shape the way they interact with their families and environments. It also requires understanding how complex systems where children spend considerable lengths of time – such as educational and health systems – adapt to the needs of children to keep them safe and optimize outcomes.

2.   I am a board-certified practicing Developmental Behavioral Pediatrician with clinical expertise in developmental delays, autism spectrum disorder, attention deficit hyperactivity disorder, mood dysregulation, disruptive behavior disorders, learning disabilities, intellectual disability, parent-child relational problems, and trauma/stressor-related disorders. I have helped build clinical programs that address the growing behavioral health needs of children in Michigan, including a multidisciplinary autism assessment clinic, an early autism recognition program in primary care offices, and a school advocacy team. I work closely with legal advocates, clinical psychologists, special educators, and outpatient therapists to coordinate care for complex patients, and therefore understand the multiple levels of children's experiences that contribute to their health and well-being.

3.   I have been researching and publishing in the field of child social-emotional development and digital media for the past 15 years. My research areas include: 1) how early childhood media use is linked with emotion regulation and executive functioning; 2) how parent smartphone use affects parenting stress, parent-child interaction, and child social-emotional

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1 development; 3) how parents and children use mobile devices, using passive sensing methods to

2 capture data directly from smartphones and tablets; 4) analysis of educational content/interactive

3 design, including manipulative "dark pattern" design, in apps and platforms popular with

4 children; 5) assessment of the amount, type, and design of advertising in apps and platforms used

5 by children; 6) examination of data collection by apps used by young children, and how this

6 differs by child socioeconomic status; and 7) interviewing parents children about their

7 conceptualizations of digital privacy and persuasive design. I also mentor a number of pediatric

8 trainees and doctoral students who study topics including smart home design, child-computer

9 interaction (i.e., how different design affordances influence child behavior and parent-child

10 interaction), and child wellbeing during remote schooling.

11   4.   I have published 57 peer-reviewed articles (in addition to 6 under review or in

12 press), many in high-impact journals such *as Journal of the American Medical Association,*

13 *Pediatrics, JAMA Pediatrics,* and *Pediatric Research.* I have also published 19 non-peer-

14 reviewed articles, 6 book chapters, and am the editor of a developmental behavioral pediatrics

15 textbook, *Encounters with Children, 5th Edition* (to be published in 2024). My published research

16 has been cited 8972 times, and my current h-index is 34 (i10-index 48).

17   5.   I founded and run a research program on children and media at the University of

18 Michigan Medical School, studying how modern forms of digital media – including smartphones,

19 tablets, interactive apps, mobile games, advertising, and video-sharing platforms like YouTube –

20 and their unique design affordances influence child social-emotional development. I have a strong

21 track record of funding from the Eunice Kennedy Shriver National Institute of Child Health and

22 Development (NICHD), including: a K23 Career Development Award in 2017 ($831,232), which

23 is a 5-year award providing research training; an R03 award ($155,584) in 2018 examining how

24 design affordances of interactive media shape parent-toddler verbal and social interactions; an

25 R21 award ($427,750) in 2018 examining mobile device use and social-emotional development in

26 3-4-year-olds; and an R41 Scientific Technology Transfer Research award from NICHD

27 ($150,000) to develop a passive sensing app, Chronicle, which I use in my research to measure

28 app and device usage by children and parents. I currently am funded by two large-scale grants

1   from NICHD, including an R01 award ($3,538,615) that examines associations of media use with

2   executive functioning development in toddlers, and a P01 multi-site award ($279,142). Over the

3   past 7 years, I have also received funding from several internal university grants, nonprofit

4   organizations like Common Sense Media and the Boston Children's Hospital Digital Wellness

5   Lab, and the Blue Cross Blue Shield Foundation. As a researcher, I understand the ethical and

6   privacy standards around collection, storage, and destruction of sensitive data about children.

7   6.   Throughout my research career, I have sought cross-disciplinary collaborations

8   with computer engineers, information scientists, privacy researchers, developmental

9   psychologists, public health researchers, and policy-oriented researchers in the United States

10 (U.S.) and internationally, so that my research can reflect the complex ways children interact with

11 modern media. Through these collaborations, my knowledge has extended beyond pediatrics into

12 understanding data collection and marketing methods, how app-based data is collected and stored,

13 monetization practices (e.g., in-app purchases, advertising) used in digital products, and how

14 policy changes might impact business practices.

15   7.   I have intentionally designed my research studies so that they can easily be

16 translated into practical parenting approaches or policies. My research has directly informed the

17 Bright Futures Guidelines for Pediatric Health Supervision, multiple American Academy of

18 Pediatrics (AAP) policy statements, petitions and complaints to the Federal Trade Commission

19 (FTC) regarding manipulative advertising and interactive design in children's apps, and has been

20 cited in U.S. Congressional testimony.

21   8.   I have also served in a leadership role at the AAP since 2015, when I was recruited

22 to join the Executive Committee of the AAP Council on Communications and Media. I was lead

23 author on two AAP policy statements – *Media and Young Minds* (2016)[1] and *Digital Advertising*

24 *to Children* (2020)[2] – which included exhaustive reviews of the research literature on children

25 and digital media. I have been elected Vice Chair of this Council and will assume the role of

26 Chair in July 2023. Under my leadership, the AAP has broadened its digital media guidance to

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[1] Radesky, Jenny and Christakis, Dimitri. "Media and young minds." *Pediatrics* 138.5 (2016).
[2] Radesky, Jenny, et al. "Digital advertising to children." *Pediatrics* 146.1 (2020).

1 not only recommend behavior change by pediatric clinicians and families, but also recommend

2 changes in technology policy and digital design.

3   9.   Through the AAP and as an independently-solicited research and clinical expert, I

4 have provided guidance to parents about healthy relationships with technology through my work

5 with HealthyChildren.org, PBS Parents, Common Sense Media, and CNN. I also designed the

6 AAP Family Media Plan, an online tool to help parents develop balanced relationships with

7 media. My work has been referenced in U.S. and international media outlets, including Time

8 Magazine, the New York Times, the Today Show, the Huffington Post, WIRED, CBS News and

9 NPR, among others. I offered guidance specific to families coping during the COVID-19

10 pandemic through my work with Noggin, Scary Mommy, Common Sense Media, and the

11 University of Michigan C.S. Mott Children's Hospital.

12   10.   I now serve as the Co-Medical Director of the AAP's Center of Excellence on

13 Social Media and Youth Mental Health. This Center was founded in 2022 and funded by the

14 Substance Abuse and Mental Health Services Administration. The Center will engage with high-

15 level stakeholders to create and disseminate resources on healthy social media use to youth,

16 caregivers, teachers, clinicians, and others who support youth wellbeing.

17   11.   Based on my expertise in children and digital technology, I am regularly invited to

18 speak at both medical and technological conferences nationally and internationally. I have been

19 invited to give Grand Rounds at children's hospitals around the U.S., regularly give plenary

20 lectures at pediatric conferences in the U.S. and internationally (Switzerland, Slovenia), and have

21 been asked to train early childhood providers throughout the U.S., Canada, and internationally

22 (Italy, Denmark, Hong Kong, United Arab Emirates). I have also been invited to speak at

23 conferences with technology industry audiences, including Common Sense Media and the

24 MIPCOM Conference (Cannes, France).

25   12.   I am regularly asked to speak to government bodies on issues related to children's

26 health and technology. My experience providing testimony includes: Michigan State Senate

27 Committee on Education in April 2021 regarding children's mental health and remote schooling;

28 U.S. House of Representatives Subcommittee on Health of the Committee on Energy and

1   Commerce in October 2021 regarding children's health and technology; and an informational

2   hearing for California Assembly Committee on Privacy and Consumer Protection and Arts,

3   Entertainment, Sports, Tourism, and Internet Media in March 2022 about children and digital

4   technology. I have been an invited speaker at Federal Trade Commission Workshops about

5   children's online privacy (October 2019), dark patterns (April 2021), and stealth advertising

6   (October 2022). I have also consulted with the White House and Surgeon General regarding the

7   needs of children in the digital environment.

8   13.   I am on the Steering Committee for Designed with Kids in Mind, a coalition of

9   groups committed to the wellbeing of children and online users across the U.S. This work puts me

10   in frequent contact with other experts in my field. I also collaborate with experts in the United

11   Kingdom (U.K.), European Union (E.U.), and colleagues who work in the technology industry.

12   14.   I have served on advisory boards for two for-profit companies, the scientific

13   advisory board for Noggin/CBS and the Board of Directors for Melissa & Doug toys. This work

14   required understanding the ways companies identify their audiences/consumers, child-centered

15   approaches in digital and non-digital product design, and how companies approach marketing and

16   data collection.

17   15.   My medical training at Harvard Medical School prepared me to understand

18   complex social, cultural, psychological, and technological determinants of health in parents and

19   children. At Harvard, I completed additional coursework in public health and epidemiology and

20   an honors thesis focusing on preventive health. I completed my pediatrics residency at Seattle

21   Children's Hospital between 2007 and 2010, when mobile technologies were first bursting onto

22   the market and into family life. I witnessed smartphones, tablets, and mobile apps being

23   introduced into family communication and routines as a primary care pediatrician in 2010-2011,

24   working at a clinic that served many families working in Seattle's tech sector. I then completed

25   subspecialty fellowship training in Developmental Behavioral Pediatrics at Boston Medical

26   Center, New England's largest safety-net hospital, from 2011-2014, which solidified my expertise

27   in child development, parent-child relationships, and the systems that shape child wellbeing.

28   16.   My *curriculum vitae*, which sets forth my experience and credentials more fully, is

1   attached as Exhibit A.

2   17.   I am being compensated in the above-entitled case at an hourly rate of $400/hour

3   for preparing this declaration. My compensation is not in any way dependent on the outcome of

4   this or any related proceeding.

5   18.   The opinions in this declaration are my expert opinions which are based on my

6   clinical and research expertise in developmental behavioral pediatrics, public health, and media

7   research; my experience reviewing the scientific literature about children and digital technology

8   and writing AAP policy statements; my experience translating the scientific literature for teaching

9   parents and professionals nationally and internationally; my experience as a board member at for-

10   profit companies; and my conversations with domestic and international experts doing work at the

11   intersection of technology and child development. My testimony represents my expertise as a

12   pediatrician and researcher, not the views of the University of Michigan or American Academy of

13   Pediatrics.

14   19.   I have reviewed AB 2273, the California Children's Age-Appropriate Design Code

15   Act. In my expert opinion, it is a necessary piece of legislation to help children experience

16   equitable opportunities in digital spaces, reduce the manipulative and egregious designs that are

17   not matched to children's unique needs, and to align with practices in the U.K. and E.U.

18   20.   I have reviewed the declaration of Serge Egelman, PhD. His description of how

19   businesses collect and use people's personal information and of the tools that exist for people to

20   limit businesses' collection and use of their personal information, and his explanation of targeted

21   and contextual advertising is consistent with my understanding of the technology.

CHILDREN'S EXPERIENCE ONLINE

Children & Digital Technology

24   21.   Children are avid users of digital technology from early ages. Many infants start

25   watching television (TV) as young as 3 months of age[3] and up to 92% of infants have used

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28   [3] Thompson, Amanda L., Linda S. Adair, and Margaret E. Bentley. "Maternal characteristics and perception of temperament associated with infant TV exposure." *Pediatrics* 131.2 (2013): e390-e397.

Declaration of Jenny S. Radesky, MD (5:22-cv-08861-BLF)

mobile devices before 1 year.[4] Young children's use of media is driven by multiple factors, including family attitudes and educational goals, needing to occupy or keep children calm, family stress, and child demands.[5] However, children's relationship with digital media fundamentally changed with the advent of internet-connected interactive technologies such as smartphones and tablets over the past 10-15 years. Compared with traditional forms of media such as TV, touchscreen interfaces allowed bidirectional interaction between children – who could more easily access, manipulate, and control touchscreen devices – and internet-connected apps and products that collect and analyze user digital data for a variety of purposes.

22.   As a result, there has been an explosion of digital products, content creators, and apps marketed to children. For example, app stores contain tens of thousands of apps in the "kids" category, many with millions of downloads. Child content on YouTube, which was not initially designed as a child-directed platform, has grown rapidly over the past decade; currently, 4 out of the 10 most-viewed YouTube channels feature children's content.[6]

23.   In addition to YouTube, children have eagerly adopted other platforms that were not initially designed for children but contain attractive features such as facial filters on Snapchat, celebrities on Instagram, and dance challenges on TikTok. As of 2021, 32% of 7-9-year-olds and 49% of 10-12-year-olds in the U.S. were reported to be using social media platforms,[7] despite terms of use requiring that users be $\geq$ 13 years of age. In 2022, the average daily time spent by U.S. children on TikTok was 113 minutes/day, Snapchat 90 minutes/day, and Pinterest 20 minutes/day.[8] Almost half of adolescents [9] describe that they use social media "almost

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[4] Kabali, Hilda K., et al. "Exposure and use of mobile media devices by young children." *Pediatrics* 136.6 (2015): 1044-1050.

[5] Barr, Rachel. "Growing up in the digital age: Early learning and family media ecology." *Current directions in psychological science* 28.4 (2019): 341-346.

[6] https://www.statista.com/statistics/373753/most-viewed-youtubers-all-time/

[7] https://www.statista.com/statistics/1293278/us-children-use-of-apps-by-age-group/

[8] Qustodio. (February 7, 2023). Average daily time spent by children in the United States on leading social media apps in 2022 (in minutes) [Graph]. In *Statista*. Retrieved April 15, 2023, from https://www-statista-com.proxy.lib.umich.edu/statistics/1301888/us-time-spent-by-children-on-social-media-apps/

[9] Vogels, E. A., R. Gelles-Watnick, and N. Massarat. "Teens, Social Media and Technology 2022. Pew Research Center: Internet." *Science & Tech. https://www. pewresearch. org/internet/2022/08/10/teens-social-media-and-technology-2022* (2022).

Declaration of Jenny S. Radesky, MD (5:22-cv-08861-BLF)

constantly" and 85% report spending more time online than they intended.[10]

24.   Video gaming has been a popular form of entertainment for children since the 1980s, but modern video game platform design allows more player-to-player communication, in-game purchases, data collection and profiling, and other design affordances that engage players. Almost 25% of parents reported that their child spent more than $50 per month on in-app purchases in smartphone games in 2020, led by *Fortnite*, *Candy Crush Saga*, and *Pokémon GO*.[11]

25.   Overall, children use interactive digital products and services for a significant proportion of their day. Common Sense Media Census data from 2020-2021 (the latest data available) reported total media usage averaging (hh:mm) 0:49 hours/day for children under 2, 2:30 for 2-4 year olds, 3:05 for 5-8 year olds, 5:33 for 6-12 year olds, and 8:39 for 13-17 year olds. Across all age groups, children are spending less time on traditional forms of media such as TV, and more time with internet-connected social media, video-sharing platforms, video-streaming services, and internet-connected multiplayer games. As described in the sections below, many of these platforms have adult-centered design affordances that introduce risk of harms and undermine children's privacy and self-determination.

Impact of COVID-19

26.   During the COVID-19 pandemic and remote learning, children's access to digital technology and time online increased significantly. Across dozens of studies, children's time online increased approximately 52% during the pandemic[12] and heavier technology use habits persisted even after pandemic restrictions were lifted.[13]

27.   The pandemic acted as an accelerant for children's use of platforms designed for adults. For example, many parents of elementary school-aged children (5-10 years) reported creating social media accounts for their children to provide contact with friends during the

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[10] Rideout, Victoria and Robb, Michael. "The Common Sense Census: Media Use by Tweens and Teens." (2021): Common Sense Media.

[11] SellCell.com. (March 3, 2020). How much do your kids spend each month on in-app purchases in smartphone games? [Graph]. In *Statista*. Retrieved April 15, 2023, from https://www-statista-com.proxy.lib.umich.edu/statistics/1107246/kids-in-app-purchases-spending/

[12] Madigan, Sheri, et al. "Assessment of changes in child and adolescent screen time during the COVID-19 pandemic: A systematic review and meta-analysis." *JAMA pediatrics* (2022).

[13] Hedderson, Monique M., et al. "Trends in Screen Time Use Among Children During the COVID-19 Pandemic, July 2019 Through August 2021." *JAMA Network Open* 6.2 (2023): e2256157-e2256157.

1   pandemic; yet almost half of the same parents report their child seeing "creepy or disturbing"

2   things online.[14]

3   28.   In addition, school-issued devices allowed young children to use internet browsers,

4   YouTube, and online video games to which many previously had no access.[15] Although many

5   schools deployed content filters on school-issued devices, investigations have found that

6   educational apps used during remote learning collected and shared private identifiers with third

7   parties,[16] school-issued device browsers contained cookies and other ad trackers,[17] and some

8   educational apps had manipulative designs that pressured children to pay for upgraded accounts.[18]

9   29.   Therefore, experiences during the COVID-19 pandemic demonstrated that 1)

10   children need access to the digital ecosystem for educational and social purposes, and therefore

11   unplugging or avoiding the online world altogether is not a viable option, and 2) even the

12   educational technology ecosystem – where it should be easy to know that users are minors – was

13   unprepared for protecting children from digital privacy violations.

14   **Businesses' Interactions with Children Online**

15   30.   Many apps and platforms used by minors are agnostic to the fact that children use

16   their products. The Children's Online Privacy Protection Act (COPPA) imposes requirements on

17   operators of websites or online services directed to children under 13 years of age, or those that

18   have actual knowledge that they are collecting personal information online from a child under 13

19   years of age, to not collect or share private information about these children without parental

20   consent. Child-directed online platforms and services, therefore, have developed data

21   minimization methods and account privacy settings. In our research interviewing 24 industry

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[14] Munzer, Tiffany, et al. "Child Media Use During COVID-19: Associations with Contextual and Social-Emotional Factors." *Journal of Developmental & Behavioral Pediatrics* 43.9 (2022): e573-e580.

[15] Chang, Connie. "Remote School as the Gateway Drug to Social Media." *The New York Times* (2020): www.nytimes.com/2020/12/10/well/family/children-social-media.html

[16] International Digital Accountability Council. "Privacy considerations as schools and parents expand utilization of ed tech apps during the COVID-19 pandemic." (2020): https://digitalwatchdog.org/wp-content/uploads/2020/09/IDAC-Ed-Tech-Report-912020.pdf

[17] Digital Futures Commission. "Governance of data for children's learning in UK state schools." (2021): https://digitalfuturescommission.org.uk/wp-content/uploads/2021/06/Governance-of-data-for-children-learning-Final.pdf

[18] Campaign for a Commercial Free Childhood. "Request for investigation of deceptive and unfair practices by the Edtech platform Prodigy" (2021): https://fairplayforkids.org/wp-content/uploads/2021/02/Prodigy_Complaint_Feb21.pdf

professionals from 17 companies who create digital products for children,[19] they described

standards of practice that not only aim to preserve child privacy but also create developmentally-

appropriate design that they test with youth and families.

31.   In contrast, in our 2019 study examining the 135 most-downloaded apps on the

Google Play "5 and under" app store,[20] we found that many platforms state in their privacy

policies that they are not directed to users under age 13. Additionally, apps that appeared to be

child-directed, with names like *Love2Learn, Edukitty,* and *Masha and the Bear,* requested

invasive permissions such as device location without parent consent, which is a violation of

COPPA. We hypothesized that some apps maintain a "General Audiences" content rating on app

stores so that they do not need to comply with COPPA requirements, despite having names such

as *Children's Doctor Dentist,* which has "children" in its title and comprises a brightly-colored

game of cleaning and pulling cartoon teeth.

32.   Because of the number of apps that appeared child-directed but requested invasive

private information in the above study, we next conducted an analysis of data collection and

sharing practices of apps known to be used by 3-4-year-old children in our NICHD-funded cohort

study.[21] In 2020, we analyzed 451 apps played by 124 children with Android devices, utilizing a

research framework that identified data flows between the apps and third party domains. We

found that two-thirds of apps collected at least one persistent identifier (e.g., android ID) and

shared this data with a multitude of third-party domains. For example, the game *Children's*

Doctor Dentist collected private identifiers such as photos, files, and wifi connections and shared

them with 5 different third-party domains such as Facebook Graph.

33.   Child data privacy violations have also been shown in large-scale analyses of

children's apps, through examination of data transmissions as well as analysis of data-collection

[19] Landesman, Rotem, Radesky, Jenny, and Hiniker, Alexis. "Let Kids Wonder, Question and Make Mistakes: How the Designers of Children's Technology Think about Child Well-Being." *Interaction Design for Children* (2023): in press.
[20] Meyer, Marisa, et al. "Advertising in young children's apps: A content analysis." *Journal of developmental & behavioral pediatrics* 40.1 (2019): 32-39.
[21] Zhao, Fangwei, et al. "Data collection practices of mobile applications played by preschool-aged children." *JAMA pediatrics* 174.12 (2020): e203345-e203345.

software development kits (SDKs) present in children's apps.[22] SDKs are made available by

technology companies to mobile app developers to enable them to create apps for specific

platforms; developers embed them in apps for purposes such as data collection. App developers

themselves report intentionally putting data harvesting mechanisms in children's apps due to

limited monetization options and the lack of design guidance in this area.[23]

34.   Many businesses interact with children via app stores, where children find and

download their products. In our 2020 research tracking the mobile devices of 3-4-year-old

children, we found that many children were playing age-inappropriate apps such as violent

mobile games with horror characters (e.g., *Granny*, *Hello Neighbor*).[24] These findings indicated

the need for device and app store design that recognizes child users.

35.   Our research has also suggested that advertising networks, which distribute ads

throughout mobile games and video-sharing platforms, may not be aware of the age of users. In

our analysis of the advertisements in popular apps labeled as "5 and Under" in the Google Play

app store, many apps contained ads with age-inappropriate content such as violent games,

alcohol, or bipolar disorder treatment.[25]

36.   YouTube is another important case example of a platform initially designed for

adult users, yet highly popular among children because of its toy unboxing, video game, and

nursery rhyme content. In 2019, the U.S. Federal Trade Commission (FTC) filed a complaint

against YouTube for collecting personal information from children without parental consent.[26]

Despite knowledge of channels directed to children on its platform, YouTube had served targeted

advertisements and, according to the complaint, told an advertising company that it did not have

users younger than 13 and therefore did not need to comply with COPPA.

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[22] Reyes, Irwin, et al. ""Won't somebody think of the children?" examining COPPA compliance at scale." *The 18th Privacy Enhancing Technologies Symposium (PETS 2018)*. 2018.

[23] Ekambaranathan, Anirudh, Jun Zhao, and Max Van Kleek. ""Money makes the world go around": Identifying Barriers to Better Privacy in Children's Apps From Developers' Perspectives." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 2021.

[24] Radesky, Jenny S., et al. "Young children's use of smartphones and tablets." *Pediatrics* 146.1 (2020).

[25] Meyer, Marisa, et al. "Advertising in young children's apps: A content analysis." *Journal of developmental & behavioral pediatrics* 40.1 (2019): 32-39.

[26] https://www.ftc.gov/news-events/news/press-releases/2019/09/google-youtube-will-pay-record-170-million-alleged-violations-childrens-privacy-law

37.   In response to the FTC filing, YouTube created a "Made for Kids" designation that content creators could self-endorse when posting a video, so that the platform would not collect data and would display only contextual advertising during those videos. However, our research demonstrates that many children 0-8 years of age do not watch only "Made for Kids" content. In a research study conducted in collaboration with Common Sense Media, we collected the YouTube viewing histories of 191 children from the 2020 Common Sense Census and analyzed the content of over 1600 videos that young children had watched.[27] We found that many channels with content popular with children (e.g., *Frozen* movie recreations, anime videos, video gamers) did not carry the "Made for Kids" designation.

38.   We concluded that self-designation of child-directed "Made for Kids" content left wide gaps in protecting children from inappropriate video or advertising content. For example, when a viewer watches "Made for Kids" videos, only other "Made for Kids" videos will appear in the recommendations feed on YouTube. Our research demonstrated that children are actually watching quite a lot of non-child-directed (general audience) content on YouTube, so recommendations may include age-inappropriate content such as violence, gender stereotypes, and horror characters. Second, the advertisements that appear during general audience YouTube videos sometimes contained ads for alcohol, dating websites, and age-inappropriate political topics (e.g., deportation).[28]

39.   These examples illustrate a pervasive set of tensions related to acknowledging child users and monetization of children's digital experiences. Existing privacy regulations (i.e., COPPA) create a disincentive for apps, platforms, and creators to identify as "child-directed," because then they cannot monetize their products by collecting/selling user data or showing targeted advertisements. In turn, this has created a culture of agnosticism about whether children are using products that are not "child-directed." Nonetheless, children are a desired audience due to their extensive time online, curiosity, and "pester power" to spend money – the very

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[27] Radesky, Jenny, et al. "Young kids and YouTube: How ads, toys, and games dominate viewing." (2020). San Francisco, CA: Common Sense Media. https://www.commonsensemedia.org/sites/default/files/research/report/2020_youngkidsyoutube-report_final-release_forweb_1.pdf

[28] Ibid.

differences that make them potentially more vulnerable to inappropriate design (see "Children are Uniquely Vulnerable in Online Spaces" section). This leads to children spending significant time with products that have design features that introduce risk, as described in the below section "Adult Centered Design Introduces Risk For Children."

Businesses Take a Reactive Approach

40.   Children's digital risks and opportunities are shaped by the design of digital products, services, and features**.** The digital ecosystem has evolved rapidly over the past 20 years, designed primarily *by* adults *for* adults. Engineers, developers, and product teams in major platforms have historically had little background in child or adolescent development, and therefore little insight into how their designs might be understood or used by youth. In designing for usability by an "average user," the needs of marginalized groups with different characteristics and experiences – such as children – are often blind spots in the design process.[29]

41.   Only when unintended consequences of design are discovered, such as pedophiles leaving comments in YouTube videos of children to indicate timestamps of sexually suggestive images,[30] or adolescents using a Snapchat speedometer filter to take photos while driving[31] – are such features addressed or removed. Engineers who created design features such as the "like" button have joined ethical technology movements after realizing that their engagement-promoting designs had unintended negative consequences for children and adults.[32] These examples emphasize the need to design child-directed products from a <u>child-centered perspective from the start</u>, rather than reactively removing problematic features from adult-centered designs once harm is discovered.

42.   Of note, when I first entered the field of children's media research, I was surprised

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[29] Lenhart, Amanda, and Kellie Owens. "The unseen teen: The challenges of building healthy tech for young people." *Data & Society* (2021). https://datasociety.net/wp-content/uploads/2021/05/The-Unseen-Teen-.pdf

[30] Fisher, Max and Taub, Amanda. "On YouTube's digital playground, an open gate for pedophiles." *The New York Times* (2019). https://www.nytimes.com/2019/06/03/world/americas/youtube-pedophiles.html

[31] Allyn, Bobby. "Snapchat ends 'speed filter' that critics say encouraged reckless driving." *National Public Radio.* (2021). https://www.npr.org/2021/06/17/1007385955/snapchat-ends-speed-filter-that-critics-say-encouraged-reckless-driving

[32] Lewis, Paul. "'Our minds can be hijacked:' the tech insiders who fear a smartphone dystopia." *The Guardian* (2017). https://www.theguardian.com/technology/2017/oct/05/smartphone-addiction-silicon-valley-dystopia

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1   to see how many of the major platforms staffed their "child safety" teams with lawyers rather than

2   child development experts or child designers. My impression is that this is a sign of platforms'

3   reactive stance to children's needs online, responding chiefly when unintended harms and liability

4   risk are discovered.

5   43.   A proactive, child-centered approach not only reduces harms but is consistent with

6   good public health. The concept of "optimal defaults" was articulated by Dr. Tom Frieden, a

7   public health expert and former director of the U.S. Centers for Disease Control and Prevention,

8   through the Health Impact Pyramid.[33] Frieden contended that interventions that <u>change the</u>

9   <u>context to make default decisions healthier</u> are most likely to make large-scale positive impact on

10   human flourishing. In contrast, interventions that require individuals to each change their

11   behavior are the least likely to make a meaningful impact.

12   44.   When applied to children's digital environments, businesses taking an "optimal

13   defaults" approach would consider children's wellbeing as a first principle,[34] rather than applying

14   design norms that carry assumptions about the ways adults use and respond to digital features

15   (hereafter referred to as 'adult-centered design.')

16   **CHILDREN ARE UNIQUELY VULNERABLE IN ONLINE SPACES**

17   45.   Children are uniquely susceptible to the design of their environments, due to their

18   smaller size, dependence on adults, and the transactional nature of child development (i.e.,

19   bidirectional influences between child, their caregivers, and their context that shape children's

20   developmental trajectories).[35] For this reason, public health policy has focused on removing toxic

21   substances from children's environments (e.g., lead from gasoline or paint), or improving access

22   to healthy foods (such as the Women Infants and Children [WIC] program), accommodating

23   children's unique learning needs (e.g., Individual with Disabilities Education Act), and preventing

24   harm (e.g., Federal Drug Administration testing of infant formula).

25

26   [33] Frieden, Thomas R. "A framework for public health action: the health impact pyramid." *American journal of public health* 100.4 (2010): 590-595.

27   [34] Radesky, Jenny, and Alexis Hiniker. "From moral panic to systemic change: Making child-centered design the default." *International Journal of Child-Computer Interaction* 31 (2022): 100351.

28   [35] Sameroff, Arnold. "Transactional models in early social relations." *Human development* 18.1-2 (1975): 65-79.

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46.   In terms of digital experiences, compared to adults, minors (children <18 years of age) have several developmental qualities that explain their increased risk of harm. Although I frame these as "vulnerabilities" within the current digital ecosystem, these characteristics are developmentally adaptive, meaning that they help serve purposes such as learning and forming social connections as children mature. Children are curious, impulsive thinkers who are drawn to novelty because it helps them explore and create a comprehensive mental model of the world. Toddlers through adolescents can be eager to elicit reactions from their caregivers or peers, to test boundaries of who they are and what they can do. The following characteristics help children learn and build social relationships in non-digital spaces, occur to greater and lesser degrees between children, and develop at different rates through childhood – but can be taken advantage of by adult-centered digital design.

    a. **Immature executive functions (EF):** EF are the "air traffic controller of the brain," and develop rapidly over the first 5 years of life and again in adolescence as the brain's prefrontal cortex develops. Through play, parent-child interactions, physical activity, sleep, and other learning and positive relationship activities, children develop skills such as emotional control, impulse inhibition, mental flexibility, perspective taking, and attentional control.[36] In early childhood, children are less able to inhibit drives to engage with novel or rewarding stimuli, while in adolescence children are more driven to engage with social relationships. In both cases, manipulative design patterns that leverage these EF weaknesses will be harder for children to resist.

    b. **Sensitivity to parasocial relationships:** Like adults, young people develop parasocial relationships with fictional characters, celebrities, or influencers whom they like or identify with. Research shows that children are more likely to follow a familiar character's instructions than a strange character or actor

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[36] Best, John R., and Patricia H. Miller. "A developmental perspective on executive function." *Child development* 81.6 (2010): 1641-1660.

they don't know.[37,38] However, these one-sided relationships are more

complicated when the influencer has a financial interest in recommending

specific products, such as *Strawberry Shortcake* recommending in-app

purchases in our study of advertising in children's apps.[39]

    c. **Attraction to novelty and rewards:** Children's behavior is very shapeable by

positive reinforcement and rewards (e.g., tangible rewards like stickers in early

childhood, "social rewards," such as visibility, attention, and positive feedback

from peers in older children). This is an adaptive part of social learning, as

children learn to repeat behaviors that are pleasurable or reinforced through

strong reactions of others, but it also means that unhealthy behaviors can be

reinforced.[40]

    d. **Limited abstract reasoning:** Children build fascinating but often incorrect

conceptualizations of the digital world based on their observations and

experiences. Children's reasoning may be egocentric and assume that design

features are only present for their benefit (not the company or designer). For

example, when we interviewed 4-10 year-olds to explore their

conceptualizations of digital privacy, we found that children understood

concepts that were transparently shown on the screen (e.g., *the app remembers*

what videos I like so it I can watch them again), but none understood the scale

of invisible digital processes through which companies make inferences about

them.[41] For example, children usually did not think that a company would

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[37] Richards, Melissa N., and Sandra L. Calvert. "Media characters, parasocial relationships, and the social aspects of children's learning across media platforms." *Media exposure during infancy and early childhood: The effects of content and context on learning and development* (2017): 141-163.

[38] Tolbert, Amanda N., and Kristin L. Drogos. "Tweens' wishful identification and parasocial relationships with YouTubers." *Frontiers in psychology* 10 (2019): 2781.

[39] Meyer, Marisa, et al. "Advertising in young children's apps: A content analysis." *Journal of developmental & behavioral pediatrics* 40.1 (2019): 32-39.

[40] De Decker, Annelies, et al. "Associations of reward sensitivity with food consumption, activity pattern, and BMI in children." *Appetite* 100 (2016): 189-196.

[41] Sun, Kaiwen, et al. ""They See You're a Girl if You Pick a Pink Robot with a Skirt": A Qualitative Study of How Children Conceptualize Data Processing and Digital Privacy Risks." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 2021.

17

know their sex based on what videos they watched or in-app items they

purchased. In contrast, participants did understand that a company would know

information that the child had knowingly provided to them, like their email

address or age.

Adult Design Norms Are Frustrating to Children

47.   Rather than creating a better user experience, children and adolescents consistently

report that adult-centered design norms make it harder for them to navigate the online spaces

where they want to connect with friends, seek information or inspiration, and express themselves.

They want the ability to search for good information and be entertained or relaxed without feeling

targeted, manipulated, or contacted by strangers. In recent work by Common Sense Media,[42]

youth have stated:

- *"Create a version for teens only to limit who can interact with us." —14-year-old messaging app user*

- *"They really need to block older people from stalking younger." —13-year-old Instagram user*

- *"Set up privacy settings for sexual content." —13-year-old TikTok user*

- *"I would make it a safer platform for teens to hang out and talk together. Right now, anyone can find you and bullies are mean." —12-year-old messaging app user*

ADULT-CENTERED DESIGN INTRODUCES RISK FOR CHILDREN

48.   Adult-centered approaches to the design of digital products, services, and features

optimize revenue generation by 1) maximizing time spent using the product, 2) maximizing reach

and scale of the product by bringing in more contacts; and 3) maximizing interactions and content

generation, which facilitates more data collection about each user. The next sections tie these

design approaches with online risks experienced by children and adolescents including: exposure

to harmful content like eating disorder, self-harm, pornography, sexual and racial violence

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[42] Nesi, Jacqueline, et al. "Teens and mental health: How girls really feel about social media." (2023). San Francisco, CA: Common Sense. https://www.commonsensemedia.org/sites/default/files/research/report/how-girls-really-feel-about-social-media-researchreport_web_final_2.pdf

1   content; monetary harm from manipulative game design; bullying and harassment; unwanted

2   contact by strangers; negative social comparisons; and interference with sleep.[43]

3   **Time-Prolonging Design**

4   49.   Engagement (e.g., time spent, frequency of pickups) is one of the main ways

5   digital product success is measured. Engagement metrics are collected and tracked through

6   analytics dashboards and inform iterative changes in interface design through methods such as

7   A/B testing (a process in which two versions of a design are released to different users at random;

8   the more engaging or higher-performing design is retained). Design features such as autoplay,

9   endless scroll, intermittent low-friction rewards, and predictive algorithms are drivers of more

10 time spent on digital media.[44,45]

11 50.   More time online is consistently associated with poorer sleep in children.[46,47] Sleep

12 quality and quantity are crucial contributors to youth mental health, attention, educational

13 success, and physical health. Meta-analyses of the research literature also support small but

14 significant associations between time spent on digital media and increased externalizing and

15 internalizing child behavior,[48] depression symptoms, and sedentary behaviors.[49]

16 51.   More time online is not necessarily perceived as a more positive experience to

17 youth. Multiple interview studies show that children and teens feel like they spend too much time

18 online, feel pressure to engage, and find it hard to stop using platforms.[50] For example, teens

19 interviewed in research conducted at the Harvard Graduate School of Education reported

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[43] Rideout, Victoria, and Robb, Michael. "Social media, social life: Teens reveal their experiences." (2018). San Francisco, CA: Common Sense Media. https://www.commonsensemedia.org/sites/default/files/research/report/2018-social-media-social-life-executive-summary-web.pdf

[44] Kidron, Beeban, et al. "Disrupted childhood: The cost of persuasive design." (2018).

[45] Zhou, Renjie, Samamon Khemmarat, and Lixin Gao. "The impact of YouTube recommendation system on video views." *Proceedings of the 10th ACM SIGCOMM conference on Internet measurement*. 2010.

[46] Janssen, Xanne, et al. "Associations of screen time, sedentary time and physical activity with sleep in under 5s: A systematic review and meta-analysis." *Sleep medicine reviews* 49 (2020): 101226.

[47] Carter, Ben, et al. "Association between portable screen-based media device access or use and sleep outcomes: a systematic review and meta-analysis." *JAMA pediatrics* 170.12 (2016): 1202-1208.

[48] Eirich, Rachel, et al. "Association of screen time with internalizing and externalizing behavior problems in children 12 years or younger: a systematic review and meta-analysis." *JAMA psychiatry* (2022).

[49] Wang, Xiao, Yuexuan Li, and Haoliang Fan. "The associations between screen time-based sedentary behavior and depression: a systematic review and meta-analysis." *BMC public health* 19 (2019): 1-9.

[50] Weinstein, Emily, and Carrie James. *Behind their screens: What teens are facing (and adults are missing)*. MIT Press, 2022.

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1   experiences like: *"I can't seem to get off my phone and most of my time is on my phone." – "You*

2   *get attached very easily and sometimes you just forget about everything and use it without any*

3   *sleep" – "I want to be able to socialize with people without turning to or checking my phone*

4   *every minute" – "I like to go outside and play sports and sometimes I just can't get off a*

5   *computer game."[51]*

6   52.   Time-prolonging features like autoplay also contribute to conflict between

7   caregivers and children[52] and more child behavior dysregulation[53] when caregivers try to set

8   boundaries around technology use.

9   **Manipulative Design and Dark Patterns**

10   53.   Human-computer interaction researchers have debated the ethics of persuasive

11   design for over two decades,[54] with general consensus that design nudges that support the user's

12   goals and best interests are "human-centered."

13   54.   In contrast, design features that manipulate or nudge the user in a way that meets

14   the technology developer's best interests – at the expense of the user's interests (i.e., time, money,

15   sleep) – have been termed "dark patterns" and described in terms of unethical video game[55] and

16   e-commerce website design.[56] In these contexts, "dark patterns" use a variety of design

17   approaches, such as prompting the player to return to the game at specified times (also called

18   "interaction-by-demand"), causing the player to complete onerous tasks if they do not make in-

19   game purchases (also called "grinding"), obscuring or de-emphasizing less expensive or opt-out

20   options, creating false scarcity of products, or applying time pressure.

21   55.   In my 2022 research with a cross-disciplinary team of experts from information

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23   ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯
     [51] Weinstein, Emily, and Carrie James. *Behind their screens: What teens are facing (and adults are missing)*. MIT Press, 2022.

24   [52] Hiniker, Alexis, et al. "Screen time tantrums: How families manage screen media experiences for toddlers and preschoolers." *Proceedings of the 2016 CHI conference on human factors in computing systems*. 2016.

25   [53] Munzer, Tiffany G., et al. "Tablets, toddlers, and tantrums: The immediate effects of tablet device play." *Acta paediatrica (Oslo, Norway: 1992)* 110.1 (2021): 255.

26   [54] Nass, Clifford, Jonathan Steuer, and Ellen R. Tauber. "Computers are social actors." *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1994.

27   [55] Gray, Colin M., et al. "The dark (patterns) side of UX design." *Proceedings of the 2018 CHI conference on human factors in computing systems*. 2018.

28   [56] Mathur, Arunesh, et al. "Dark patterns at scale: Findings from a crawl of 11K shopping websites." *Proceedings of the ACM on Human-Computer Interaction* 3.CSCW (2019): 1-32.

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science, communication studies, developmental psychology, and pediatrics, we identified the types of manipulative dark patterns that appear in apps and platforms used by children.[57] Our research team downloaded and played 133 apps that had been used for long durations by 160 preschool-aged children in our NICHD-funded cohort study. Dark patterns were apparent in 80% of apps, taking the form of parasocial relationship pressure (e.g., when the user hasn't played the *Miraculous* game that day, the main character sends notifications to the child to reengage with the game), fabricated time pressure (e.g., count-down clocks during stoppage points in the game, such as in between levels of *Subway Surfers,* that create a sense of urgency that the user should keep playing or watch an ad), and navigation constraints (e.g., games auto-advancing to the next level with no option to save and quit; in-app marketplaces showing the most expensive items first). These easy-to-identify design features appeared designed to meet 3 goals: 1) prolonging engagement with the app, 2) encouraging purchases, and 3) viewing ads, and were more common in apps played by children from lower-income and lower-education households.

56.   Manipulative dark patterns are known to cause monetary harm to children. In March 2023, the FTC filed a complaint with Epic Games, the maker of *Fortnite*, requiring the company to pay $245 million as penalty for the use of dark patterns to manipulate users into making purchases.[58]

Frictionless Contacts

57.   Digital products achieve large-scale adoption and larger network effects (defined as a phenomenon in which a product gains more value as more people use it) through connecting to each users' saved contacts, which then allows the possibility of connecting through indirect contacts (i.e. friends of friends), and facilitates low-friction contact between strangers. Prior to 2021, many social platforms also set teen user profiles to public by default, which facilitated interaction with strangers.

58.   However, children consistently describe unwanted contact from strangers on

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[57] Radesky, Jenny, et al. "Prevalence and characteristics of manipulative design in mobile applications used by children." *JAMA Network Open* 5.6 (2022): e2217641-e2217641.
[58] Federal Trade Commission, 'FTC Finalizes Order Requiring Fortnite maker Epic Games to Pay $245 Million for Tricking Users into Making Unwanted Charges' (March 2023)

platforms such as Snapchat, TikTok, and Instagram,[59,60] with consequences varying from annoyance to harassment by large numbers of users.

59.   Marketers of detrimental content can easily contact minors when account settings are public. In a 2021 study performed by Revealing Reality and the 5Rights Foundation, researchers created avatars of child users – fake accounts on social media platforms set up to replicate the usage behavior of real children and adolescents whom the researchers had interviewed.[61] On all platforms (e.g., TikTok, Instagram), the privacy settings were set to public by default at that time. Within days of opening accounts, adolescent avatars received direct messages from accounts they did not follow, including being added to group chats with strangers and contacts from marketers of detrimental material such as pornography and diet products.

60.   Online solicitation, grooming, and exploitation of minors is a chief risk of adult-centered design that maximizes contacts. This occurs when individuals with a sexual interest in minors aim to locate a child for potential sexual abuse, send or request sexually explicit material, and/or coerce the child to pay money or complete other activities to prevent release of sexually explicit photos of the child.[62] Although incidence is typically underreported, as children may not realize that they are being contacted by an adult posing as a child, in 2021 the National Center for Missing & Exploited Children received a total of 29.3 million reports of suspected online child sexual exploitation, an increase of 35% from 2020. This included 44,155 reports of online enticement of children for sexual acts and 5177 reports of unsolicited obscene material sent to a child.[63]

Connection to Illegal or Unsafe Activities

61.   Because design features promote content creation and integrate metrics for

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[59] Nesi, Jacqueline, et al. "Teens and mental health: How girls really feel about social media." (2023). San Francisco, CA: Common Sense. https://www.commonsensemedia.org/sites/default/files/research/report/how-girls-really-feel-about-social-media-researchreport_web_final_2.pdf

[60] 5Rights Foundation. "Pathways: How digital design puts children at risk." (2021): https://5rightsfoundation.com/uploads/Pathways-how-digital-design-puts-children-at-risk.pdf

[61] 5Rights Foundation. "Pathways: How digital design puts children at risk." (2021): https://5rightsfoundation.com/uploads/Pathways-how-digital-design-puts-children-at-risk.pdf

[62] Kloess, Juliane A., Anthony R. Beech, and Leigh Harkins. "Online child sexual exploitation: Prevalence, process, and offender characteristics." *Trauma, Violence, & Abuse* 15.2 (2014): 126-139.

[63] National Center for Missing & Exploited Children, CyberTipline 2021 Report. https://www.missingkids.org/gethelpnow/cybertipline/cybertiplinedata

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1 popularity, children seeking peer validation may take part in extreme content generation (e.g.,

2 posting dangerous challenges) to receive validation online.

3   62.   One of the main categories of detrimental online content involves promotion of

4 unsafe eating disorder and self-harm behavior. "Pro-Ana" sites and social media accounts teach

5 children how to engage in fasting, laxative use, and excessive exercise, as well as how to conceal

6 these behaviors from caregivers, while pro-cutting sites depict and describe how to perform

7 nonsuicidal self-injury.[64] Despite efforts from platforms to block these accounts, recent research

8 of 153 popular Instagram accounts that celebrate "thinspiration" or "bonespiration" found that

9 these accounts were followed by 1.6 million unique users,[65] meaning they could possibly be

10 recommended to child users based on their profiles.

11   63.   Youth report encountering pro-eating disorder content on social media and feeling

12 frustrated that they need to actively resist or remove it from their feeds: *"At the height of my*

13 *eating disorder, I used social media as a fuel for my obsession with weight loss. I took the content*

14 *they recommended to me of perfect toned bodies and tips for weight loss religiously, it motivated*

15 *me when I was at my worst to continue down that destructive path of destroying my health. It was*

16 *only when I learned to distance myself from social media could I then use my outside perspective*

17 *to see just how horrible the impact was. But it was up to me to actively try and change my social*

18 *media feeds, I had to do the hard work. This content was just always in my feed already, and*

19 *somehow it was my responsibility to get it out." – 17 year old with history of eating disorder.*[66]

20   **Targeted Advertising**

21   64.   Targeted marketing differs from traditional advertising (e.g., mass media such as

22 newspaper ads or TV commercials, in which all users see the same ads) and contextual

23 advertising (i.e., in which the content of the ad is determined by what the user is watching, such

24 as an advertisement for toys before a video on a YouTube toy unboxing channel) in several ways

25 that introduce risk to children. When a business infers characteristics of a child based on their

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26 [64] Lewis, Stephen P., et al. "The scope of nonsuicidal self-injury on YouTube." *Pediatrics* 127.3 (2011): e552-e557.

27 [65] Farthing, R. "Designing for Disorder." (2022): Fairplay: https://fairplayforkids.org/wp-content/uploads/2022/04/designing_for_disorder.pdf

28 [66] *Ibid.*

1   online behavior (e.g., likes, purchases, selections, hovering, sequence of web site visitations,

2   frequency of refreshing feeds, etc.), these numerous and complicated digital traces reveal

3   vulnerabilities about the child that could easily be targeted for monetization.

4   65.   For example, a child who shows impulsive in-game spending at certain times of

5   day or at specific reward thresholds may be sent ads that appeal to impulse spending, sports

6   betting, or casino games. A child whose digital behaviors reveal negative body image and body

7   comparisons, for example through interaction with specific celebrity accounts, hovering over

8   images that show distorted body sizes, etc. may be sent advertisements for extreme diets, weight

9   loss supplements, or other content that reinforce unhealthy eating practices. A child whose social

10 media use behaviors suggest social isolation, an unresponsive peer group, and sensitivity to social

11 feedback might be sent ads for anonymous apps that allow risky contact with strangers. A child

12 whose liking/hovering behaviors suggest attraction to female bodies might be sent ads for

13 pornography websites. These are only a few examples of ways that profiling might lead to a child

14 receiving detrimental marketing material, which they might find difficult to resist due to limited

15 impulse control.

16   66.   Such profiling of adolescent users has been identified by research. In 2021, Reset

17 Australia performed a "secret shopper" study, posing as an advertiser on Facebook, to examine

18 how that platform allows advertising to be targeted at adolescents.[67] The researchers found that

19 Facebook allowed advertisers to choose teens as a target audience, in addition to profiled

20 categories such as smoking, gambling, alcohol, or extreme weight loss.

21   67.   A recent investigation by VicHealth in Australia recruited 204 participants aged

22 16-25 years who shared information about what mobile ads they received and information that

23 Facebook had created about them in its advertising model.[68] Overall, 21% of participants had

24 been assigned "gambling" as an interest by Facebook. In 54 participants under 18, 64% reported

25 "sometimes" or "regularly" receiving gambling and sports betting ads.

26   [67] Williams, Dylan, et al. "Profiling children for advertising: Facebook's monetization of young people's personal data." (2021): Reset Australia Policy Memo. https://au.reset.tech/uploads/resettechaustralia_profiling-

27 children-for-advertising-1.pdf

     [68] VicHealth. "Dark marketing tactics of harmful industries exposed by young citizen scientists." (2023):

28 https://www.vichealth.vic.gov.au/media-and-resources/citizen-voices-against-harmful-marketing

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68.   In summary, as children's interests and characteristics are developing over childhood and adolescence, there is a risk that they will be sorted based on their data-driven profiles, and this will shape what opportunities and risks they are provided through targeted advertising messages or algorithmic recommendations.

Algorithmic Application of Extreme Content

69.   YouTube has stated that 70% of time on that platform comes from algorithmic recommendations.[69] Engagement metrics like time-on-task and click-through rates are agnostic to the quality of content children engage with, and recommender systems trained with engagement data from A/B testing prioritize whatever children happen to pay attention to. This leads to algorithms that are not only capable of surfacing extreme and disturbing content but are highly likely to do so.[70]

70.   Algorithms feature content that is trending, so creators report that they tailor their products, personas, and videos in ways that make their content more visible and viral within the platform marketplace.[71,72] This in turn can be reinforced by child users, who value posts with more "likes" as more attractive, are more likely to "like" that content,[73] and therefore be more likely to be recommended similar posts.

71.   When recommended by the platform, and with associated "likes," dangerous or risky content may be seen by youth as more attractive or validated. In a functional magnetic resonance imaging (fMRI) study in which high school and college students were shown feeds of risky (e.g., drug paraphernalia) and neutral (e.g., people, food) social media images, the high school students showed lower activation of the cognitive control portions of the brain's

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[69] Solsman, Joan. "YouTube's AI is the puppet master over most of what you watch." *CNET*, Jan 10, 2018: https://www.cnet.com/tech/services-and-software/youtube-ces-2018-neal-mohan/

[70] Ribeiro, Manoel Horta, et al. "Auditing radicalization pathways on YouTube." *Proceedings of the 2020 conference on fairness, accountability, and transparency*. 2020.

[71] Al-Subaihin, Afnan A., et al. "App store effects on software engineering practices." *IEEE Transactions on Software Engineering* 47.2 (2019): 300-319.

[72] Wu, Eva Yiwei, Emily Pedersen, and Niloufar Salehi. "Agent, gatekeeper, drug dealer: How content creators craft algorithmic personas." *Proceedings of the ACM on Human-Computer Interaction* 3.CSCW (2019): 1-27.

[73] Sherman, Lauren E., et al. "The power of the like in adolescence: Effects of peer influence on neural and behavioral responses to social media." *Psychological science* 27.7 (2016): 1027-1035.

prefrontal cortex when viewing risky images.[74] This finding suggests that adolescents may respond to recommended extreme or risky content with more acceptance, and less inhibition, than older users.

Lack of Policy Enforcement

72.   Although platforms have official policies about allowable content, community guidelines, and behavior expectations, their methods for enforcing policies are not transparent. For example, YouTube policy states that "video games unsuitable for children" may not advertise on YouTube content set as made for kids; however, in our 2020 study with Common Sense Media analyzing YouTube videos watched by 0-8-year-olds, we frequently observed violent-themed video games (e.g., Peppa Pig apparently injured with eyes crossed out) in banner ads overlying children's videos.[75]

BENEFITS OF CHILD-CENTERED DESIGN

73.   Child-centered design advocates – including Fred Rogers, Sesame Workshop, the Designing For Children's Rights Coalition in Europe, and the 5Rights Foundation in the UK – focus on the following concepts when considering children's needs in digital spaces: 1) allowing space for safe and autonomous exploration, play, expression, imagination, failure, and repair; 2) healthy relationships, whether with themselves, caregivers, peers, or characters/influencers; 3) respect for the child's need for varied experiences throughout the day (e.g., sleep, sports, reading, school); 4) transfer/synthesis of concepts and experiences from the digital world to the physical one (i.e., helping children make sense of what they see and experience online); and 5) helping children self-regulate their media use and disengage at will.[76] The adult-centered design norms that encourage more engagement, contact with others, pressure to perform or consume, or constant contact with others often act at cross purposes with these concepts, contributing to harms

[74] Sherman, Lauren E et al. "Peer Influence Via Instagram: Effects on Brain and Behavior in Adolescence and Young Adulthood." *Child development* vol. 89,1 (2018): 37-47. doi:10.1111/cdev.12838

[75] Radesky, Jenny, et al. "Young kids and YouTube: How ads, toys, and games dominate viewing." (2020). San Francisco, CA: Common Sense Media. https://www.commonsensemedia.org/sites/default/files/research/report/2020_youngkidsyoutube-report_final-release_forweb_1.pdf

[76] Radesky, Jenny, and Alexis Hiniker. "From moral panic to systemic change: Making child-centered design the default." *International Journal of Child-Computer Interaction* 31 (2022): 100351.

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1   described above.

2   **Child-Centered Design Encourages Children's Self-Determination**

3   74.   Supporting children's self-determined and autonomous behavior is important to

4   child wellbeing in both digital and non-digital contexts.[77] When experiencing externally-

5   motivated engagement that results from design features like autoplay, tailored feeds, and

6   streaks,[78] children and adolescents describe that managing the *"constant bombardment of*

7   *content"* feels like "*a job*," which leads to a sense of loss of control: *"You are constantly being*

8   *alerted about everything, and it can be hard to focus*."[79]

9   75.   In contrast, user experience designs that support self-determination include natural

10   stopping points, cues, and prompts that help children pause, self-reflect, and contextualize what

11   they are seeing to off-screen experiences. Prior work has shown that adolescents find experiences

12   with technology most meaningful when they are investing in something that can transcend the

13   specific usage session, such as a relationship with a loved one or a learning experience they can

14   transfer to the physical world.[80]

15   76.   In quality early childhood programming, it is a design norm to encourage

16   disengagement or play when a show ends, rather than encouraging continued use. In lab-based

17   studies, user interface designs that let a child plan out their video viewing, with cues for

18   disengagement when the videos are done, lead to significantly less distress when a child needs to

19   transition to another activity.[81]

20   77.   These examples illustrate the fact that user interface design is a modifiable factor

21   in determining whether children have excessive vs. self-controlled, or platform-persuaded vs.

22   self-determined digital experiences.

23

24   [77] Radesky, Jenny, and Alexis Hiniker. "From moral panic to systemic change: Making child-centered design the default." *International Journal of Child-Computer Interaction* 31 (2022): 100351.

25   [78] Lewis, Chris. *Irresistible Apps: Motivational design patterns for apps, games, and web-based communities*. Apress, 2014.

26   [79] Weinstein, Emily, and Carrie James. *Behind their screens: What teens are facing (and adults are missing)*. MIT Press, 2022.

27   [80] Tran, Jonathan A., et al. "Modeling the engagement-disengagement cycle of compulsive phone use." *Proceedings of the 2019 CHI conference on human factors in computing systems*. 2019.

28   [81] Hiniker, Alexis, et al. "Plan & play: supporting intentional media use in early childhood." *Proceedings of the 2017 conference on interaction design and children*. 2017.

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1

Child-Centered Design Centers Children's Digital Privacy

2   78.   Users of technology are measured, followed, and profiled for several purposes: 1)

3   for a personalized experience that predicts what content or features the user might want to engage

4   with, thereby extending time on the platform; 2) for targeted advertising, to increase the

5   likelihood of meeting the right consumer at the right time; and 3) for targeted pushes of

6   monetization (e.g., in-app purchases, high-stakes rewards) in games, to increase revenue.

7   79.   From a child or adolescent perspective, this limits self-determination and

8   autonomy by: 1) habituating users to following recommendations rather than initiating searches,

9   2) potentially recommending content or features that are not age-appropriate or harmful, 3)

10   promoting advertising that taps into a child's vulnerabilities (e.g., impulse control deficits, poor

11   body image, gender-based biases, depressed mood) about which they may have limited insight,

12   and therefore cannot reflect upon when making decisions about what content to consume or

13   purchases to make.

14   80.   In contrast, privacy-preserving child-centered design would allow more digital

15   self-determination through 1) the user actively searching for or endorsing interests in content that

16   can be offered to them; 2) discovering a less extreme range of ideas or content through

17   recommendations that align with their expressed interests by, for example, utilizing their interest

18   in workouts and makeup, rather than their behavioral profile revealing an undisclosed

19   characteristic the platform has inferred about the child that increases the likelihood that they may

20   click on highly sexualized or body dysmorphic content, and 3) facilitating disengagement through

21   stoppage cues, reflection points, or less aggressive recommendation of hard-to-resist "clickbait"

22   content.

23   **A Blueprint for Child-Centered Design**

24   81.   Across the landscape of children's digital media, there are many successful

25   examples of content producers partnering with child development experts and using

26   developmental principles to guide the design of a product from its inception.

27   82.   We interviewed 24 U.S.-based industry professionals from companies that design

28

1   digital content for youth to understand their processes of centering the child's experience.[82] All

2   participants in this study described data minimization and privacy-conserving practices, either

3   because these practices were not necessary for creating a good experience for their child and

4   adolescent audiences, or due to wanting to avoid content and contact risks.

5   83.   When asked about how they promote engagement with their child-centered

6   products, most participants stated that they focused on creating strong characters, storylines, or

7   learning experiences that would connect with the child in a meaningful way. Conversely, some

8   participants criticized "app farms" and developers who see monetization and engagement

9   analytics, not child experience, as the end goal.

10   84.   Internationally, the Institute of Electrical and Electronics Engineers (IEEE) has

11   introduced new design standards that comply with U.K. and E.U. data protection regulations.[83]

12   IEEE has been working with companies such as LEGO, IBM, and SuperAwesome to publish

13   detailed applied case studies[84] that demonstrate feasibility of following child-centered data

14   regulations in commercial products and provide a blueprint for other businesses aiming to comply

15   with EU- and UK-based data privacy regulations.

16   85.   Thus, data minimization is feasible and becoming more widely adopted.

17   **CALIFORNIA CHILDREN'S AGE-APPROPRIATE DESIGN CODE ACT**

18   86.   The California Children's Age-Appropriate Design Code Act requires that

19   businesses that provide services, products or feature that are likely to be accessed by children are

20   required to comply with requirements that I understand as accomplishing three important goals.

21   First, the Act requires that businesses acknowledge when children are using its product, feature,

22   or service – a crucial step forward in an ecosystem that is often age-agnostic– and encourages

23   them to update their practices to be data-minimizing and age-appropriate. Second, the Act creates

24   accountability mechanisms that would require businesses to proactively think about what types of

25   [82] Landesman, Rotem, Radesky, Jenny, and Hiniker, Alexis. "Let Kids Wonder, Question and Make
     Mistakes: How the Designers of Children's Technology Think about Child Well-Being." *Interaction Design for*
26   *Children* (2023): in press.
          [83] IEEE Standards Association. Designing Trustworthy Digital Experiences for Children.
27   https://engagestandards.ieee.org/Childrens-tech-design-governance.html
          [84] Nguyen, Stephanie. "Applied Case Studies for Children's Data Governance" (2021): IEEE.
28   https://engagestandards.ieee.org/rs/211-FYL-955/images/IEEESA-Childrens-Data-Governance-Report.pdf

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1   harms children might experience using their product, rather than acting reactively when

2   unintended harms are identified. Finally, the Act would establish standard norms of child-

3   centered design that prioritize children's autonomy and self-determination in digital spaces, rather

4   than allowing children to be profiled and recommended content, ads, or contacts that may

5   mismatch with children's unique vulnerabilities. I describe the relevance of these requirements

6   for child wellbeing in the following sections.

7   87.   The Act would require that businesses that provide an online service, product, or

8   feature likely to be accessed by children comply with specified requirements. This is an important

9   distinction from the prior standard under COPPA, which only specified that child-directed

10   services or products comply. As described above, children have been avid and sometimes

11   unpredictable explorers of the online world, and it is therefore crucial that an accountability

12   mechanism exist for businesses acknowledging when children are using their service, product, or

13   feature – whether it was initially designed for them or not. We acknowledge and make

14   accommodations for children in other public and private spaces, such as hospitals, schools, and

15   stores, but the same standard does not apply to the digital spaces where children are spending

16   their time.

17   88.   The Act recognizes the important differences in child needs by different

18   developmental stages: 0-5, 6-9, 10-12, 13-15, and 16-17 years. This is crucial because children

19   have different understanding of digital privacy and digital content at different ages; children need

20   different levels of supervision and scaffolding from caregivers at different ages; and this approach

21   represents an ideal way of setting children on a healthy trajectory of a relationship with media,

22   adapting their degree of independence and communication needs over time. Products, services,

23   and features can either be designed in a manner than is appropriate for all age ranges by default;

24   or, they can use age estimation to tailor their design to the needs of specific age groups.

25   89.   The Act limits the use of features that profile children using their previous

26   behavior, browsing history, or assumptions of their similarity to other children to offer

27   detrimental material. As described above, this protects children from being recommended

28   content, ads, or contacts that could interact negatively with their unique inferred characteristics –

characteristics about which many children are not consciously aware. In clinical settings, when we perform evaluations to clarify psychological or developmental differences in children, we plan multi-level (e.g., home, school, community) supports to help children build new skills. In contrast, targeted marketing profiles and leverages these psychological traits to meet the monetization needs of the business, regardless of whether this leads to benefit or detriment to the child. Furthermore:

a. Disabling profiling does not prevent a child from seeking out detrimental content, but prevents such content from being amplified or recommended to children resulting in harm. In turn, this may reduce the likelihood that content creators will create and share more extreme content to "game" the system with the goal of trending on a recommendations algorithm for youth audiences.

b. Disabling profiling does not prevent children from actively telling a business what they want to see in a recommendations profile – e.g., nature, dance videos, LGBTQ+ supportive content, body positivity content, racial justice content, etc. Instead, it prevents recommendations based on inferences of characteristics that may reveal individual susceptibilities.

c. Such an approach is ethical because it aligns with how children understand digital privacy. In our study[85] and others[86] that have interviewed school-aged and teen-aged children about their understanding of digital privacy, children consistently appear to understand that information they knowingly gave to platforms (i.e., when setting up an account profile) was remembered about them; however, they had more difficulty understanding when inferences about them were made/stored by a business (e.g., that they are female from what videos they watch).

90. The Act requires that businesses providing online products, services, or features

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[85] Sun, Kaiwen, et al. "'They See You're a Girl if You Pick a Pink Robot with a Skirt": A Qualitative Study of How Children Conceptualize Data Processing and Digital Privacy Risks." *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*. 2021.

[86] Livingstone, Sonia, Mariya Stoilova, and Rishita Nandagiri. "Children's data and privacy online: growing up in a digital age: an evidence review." (2019). https://eprints.lse.ac.uk/101283/1/Livingstone_childrens_data_and_privacy_online_evidence_review_published.pdf

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1 likely to be accessed by children conduct a Data Protection Impact Assessment (DPIA). This

2 Assessment can help businesses understand whether their product could lead to any content,

3 contact, and conduct risks and reassess whether the product is being used by children in

4 unintended ways. The Act thus creates an accountability mechanism for proactively identifying

5 and mitigating the risks described above, rather than identifying harms retroactively. This could

6 prevent situations like that revealed by the internal records released by Facebook whistleblower

7 Frances Haugen, which showed that the company was aware of adolescents' views that Instagram

8 contributed to their suicidal thoughts and negative body image, but did little to mitigate the

9 issue.[87]

10   91. Additionally, DPIAs would serve an auditing mechanism that currently occurs in a

11 piecemeal fashion with individual investigations from academic research teams and consumer

12 watch dog groups. When my research assistants conduct assessments of the advertising or data

13 collection practices of apps used by children, they are sometimes appalled by what they find.

14 They wonder whether companies are aware of what inappropriate content, ads, and design they

15 are offering to children, or whether the companies are too large-scale to effectively monitor how

16 their products are being experienced by the millions of children who use them. DPIAs are an

17 essential mechanism for businesses taking more responsibility over what children encounter.

18   92. The Act would create a Working Group so that harms can be defined by a

19 balanced team of experts from a variety of backgrounds including child health/wellbeing,

20 technology design, and other stakeholders. Representation from a variety of fields will help the

21 guidance be evidence-based and not depend on subjective standards. It is important that industry

22 has a voice in determining design solutions as members of the Working Group, since many large

23 platforms have already hired teams with child expertise and have developed approaches to

24 comply with E.U. and U.K. regulations. As noted above, progress is being made in the U.S. and

25 internationally on child-centered design, which can be a resource to the Working Group as they

26 work to generate novel solutions.

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28 [87] "The Facebook Files." *The Wall Street Journal.* (2021): https://www.wsj.com/articles/the-facebook-files-11631713039

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93.   The Act would require business to enforce published terms, policies, and community standards. Studies have shown that businesses are not enforcing their privacy policies.[88,89] This makes it challenging for consumers to make informed decisions about whether they want to join different online communities, not knowing whether stated policies and standards will be followed.

94.   The Act would require businesses to provide prominent, accessible, and responsive tools to help children, or if applicable their parents or guardians, exercise privacy rights and report concerns. Currently there is no method for parents or youth seeking to provide feedback (other than blocking/reporting content) or report a recurrent problem with specific platforms. Parents whose children have died after cyberbullying or taking part in social media challenges have reported trying to get in touch with social media companies, but being ignored.[90]

95.   I understand Plaintiff argues that it aims to "empower parents to supervise children's privacy online." As a practicing pediatrician and expert who regularly provides resources aimed at empowering parents to help their children have healthy relationships with technology, I have heard from parents and child-centered technology designers that maintaining digital privacy is a near-impossible task when data are invisible and terms and conditions unintelligible. In other words, parents and caregivers (and youth themselves) cannot monitor or protect against what they cannot see. The Act would make high levels of privacy the default, would make terms of service and privacy policies understandable to children and caregivers, and it would keep platforms and services accountable to following their stated policies (which, as noted above, is frequently not the case).

96.   I understand that Plaintiff in this case claims that age estimation is a privacy-invasive process and that it is currently not feasible to estimate user age without collecting and processing additional personal information. This is not the case, for several reasons.

[88] Andow, Benjami, et al. "Actions speak louder than words: Entity-sensitive privacy policy and data flow analysis with policheck." *Proceedings of the 29th USENIX Security Symposium (USENIX Security'20)*. 2020.

[89] Okoyomon, Ehimare, et al. "On the ridiculousness of notice and consent: Contradictions in app privacy policies." *Workshop on Technology and Consumer Protection (ConPro 2019), in conjunction with the 39th IEEE Symposium on Security and Privacy*. 2019.

[90] Bride, Kristin. Written Testimony. United States Senate Committee on the Judiciary Hearing on Protecting Our Children Online. February 14, 2023

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a.   Platforms such as Google, Instagram, and TikTok have removed child accounts (who provided a false birthday when signing up) by using information the child user had freely provided, such as profile information or photographs, without the need to collect additional data.

b.   In the European Union, Google has described its age estimation approach as 1) asking users to provide a birthdate during account creation, 2) when accounts state they are 18+ but Google's machine learning analysis of specific online behavior suggests otherwise (e.g., searches, sites visited, and videos watched contain cartoons or child-interest material, rather than searches for taxes and mortgage), they notify the user that they are being placed in 'child mode.'[91] At this point, adults have the option to show evidence of their age through other means, such as the Yoti age-estimation software.[92]

c.   Furthermore, children and adolescents will have a greater incentive to be honest about age reporting during account creation, because identification as a minor will allow access to child-centered design resulting from the Act, which in turn will reduce the negative experiences children routinely report.[93]

d.   Alternately, platforms have expressed optimism that age verification or estimation solutions will exist at the device level.[94] Particularly for child users, hardware (e.g., smartphones, tablets, laptops) have the ability to allow different logins by user, either manually or through locally-analyzed and stored biometric information, which can then signal to other apps, platforms, and services whether the user is a child or not. Streaming video platforms such as Netflix currently allow the user to create child subaccounts to provide age-appropriate video content. If device-level or browser-level age estimation solutions are used, then individual companies will not

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[91] Safer Internet Forum (SIF) 2021, Deep Dive Session 1: https://www.youtube.com/watch?v=lvqYDndLFNQ

[92] https://www.yoti.com/business/facial-age-estimation/

[93] Nesi, Jacqueline, et al. "Teens and mental health: How girls really feel about social media." (2023). San Francisco, CA: Common Sense. https://www.commonsensemedia.org/sites/default/files/research/report/how-girls-really-feel-about-social-media-researchreport_web_final_2.pdf

[94] https://about.fb.com/news/2022/06/new-ways-to-verify-age-on-instagram/

1   need to use resources for these processes; they can instead focus on maintaining an

2   age-appropriate experience for users under 18.

3   97.   I understand that the Plaintiff in this case questions the rigor of the term "dark

4   patterns," which as described above are an established concept in the human-computer interaction

5   literature cited in dozens of publications and international conferences. The term "dark patterns"

6   was coined in 2010 by the user experience (UX) designer, Harry Brignull, to describe "tricks used

7   in websites and apps that make you do things that you didn't mean to, like buying or signing up

8   for something."[95] The OECD Committee on Consumer Policy have a working definition: "Dark

9   commercial patterns are business practices employing elements of digital choice architecture, in

10   particular in online user interfaces, that subvert or impair consumer autonomy, decision-making

11   or choice. They often deceive, coerce or manipulate consumers and are likely to cause direct or

12   indirect consumer detriment in various ways, though it may be difficult or impossible to measure

13   such detriment in many instances."[96] In the U.S., the term "dark patterns" has been used in

14   California legislation (California Privacy Rights Act),[97] and by the Federal Trade Commission in

15   the April 2021 workshop entitled "Shedding Light on Dark Patterns." The term and the concept is

16   widely used, acknowledged, and accepted.

17   98.   The Plaintiff also states that the California Consumer Protection Act (CCPA)

18   already provides digital privacy protections. However, the CCPA only covers collecting,

19   selling/sharing data and parental authorization. For all the reasons explained above, this Act is

20   needed to provide the protections that address children's needs uniquely, such as addressing

21   profiling, engagement-prolonging practices, dark patterns, and DPIA requirements. Without

22   these, businesses can continue to be agnostic to their child users and employ adult-centered

23   design that introduces risk.

24   99.   Plaintiff uses a bookstore metaphor to argue why the Act would be problematic.

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26   [95] Brignull, Harry. "Dark patterns: Deception vs. honesty in UI design." *Interaction Design, Usability* 338 (2011): 2-4.

27   [96] Organization for Economic Cooperation and Development. "Dark commercial patterns", *OECD Digital Economy Papers*, No. 336, OECD Publishing, Paris, https://doi.org/10.1787/44f5e846-en.

28   [97] The California Privacy Rights Act (CPRA), also known as Proposition 24, is a ballot measure that was approved by California voters in 2020, amending the California Consumer Privacy Act

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1   This is an incorrect and insufficient metaphor because 1) bookstores are a physical space where

2   children can be seen by the people who work there, compared to the age-agnostic approach used

3   by many platforms described above; 2) bookstores are not a low-friction environment where titles

4   are suggested based on prior behavior – people can freely peruse the aisles and can ask for help;

5   3) bookstores are not invisibly collecting data about patrons' preferences, how long they linger

6   past a shelf, or whether they pick up a book and then put it back, for example, to decide which

7   books to recommend to that user with an algorithm that has been trained on number of sales. The

8   bookstore analogy may be intended to activate heuristic-based anxieties about free speech (i.e.,

9   book banning), but this is not the mechanism by which the Act would work.

10   **OPINIONS**

11   100.   The technology industry is relatively nascent, has grown rapidly while recognizing

12   harms only retrospectively, and therefore can be "debugged" and redesigned in a way that reduces

13   harm for minors while maintaining a free and open internet for adults. Most importantly, the Act

14   introduces accountability mechanisms so that our society can move past its current impasse of

15   family stress, teen mental health issues, technology platform denials, and an invisible data

16   harvesting and profiling machine that does not allow youth to have optimal self-determined

17   experiences online. The tensions dominating the current public debate about risks and benefits of

18   social media for youth are directly related to the fact that, with children, businesses are using

19   adult-centered design that prioritizes engagement and monetization.

20   101.   The Act establishes standards of data privacy and child-centered design that will

21   be proactive and imperative as artificial intelligence and the metaverse continue to develop and be

22   used more widely by children.

23   102.   The Act is feasible because it would build upon work already underway to comply

24   with U.K. and E.U.-based data protections, operationalized through the guidance of a

25   multidisciplinary working group of stakeholders. This Working Group would provide businesses

26   with a say in how specific processes – such as age estimation or user consent – are designed, and

27   would provide opportunities for innovative solutions. Feasibility of child-centered changes is also

28   evidenced by changes rapidly made by platforms such as Instagram (making minors' accounts

1   private by default) and YouTube (disabling nighttime notifications to minors) before the U.K.

2   Age-Appropriate Design Code went into effect in September 2021. In truth, these child-centered

3   designs were needed years ago, but under the Act, such design decisions would be made more

4   proactively.

5   103.   California has a critical opportunity to improve child wellbeing on a population

6   scale by making child-centered design the default setting in digital products, services, and

7   features that children use every day. The current digital ecosystem contains design features that

8   were not designed with child users in mind, with endpoints of revenue generation, and which

9   introduce risk in multiple ways described above. Yet, children need and deserve access to digital

10 spaces where they can learn, play, explore, and socialize without being tracked, manipulated, fed

11 offensive or traumatic content, or exploited.

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I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on <u>April 20, 2023</u> **, at** <u>Ann Arbor, Michigan</u> **.**

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Dr. Jenny S. Radesky

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