

Before the
Federal Trade Commission
Washington, DC 20580

In the Matter of
Petition for Rulemaking to Prohibit the
Use on Children of Design Features that
Maximize for Engagement

Center for Digital Democracy
Fairplay

Accountable Tech
American Academy of Pediatrics
Becca Schmill Foundation, Inc.
Berkeley Media Studies Group
C. Everett Koop Institute at Dartmouth
Center for Humane Technology
Children and Screens: Institute of Digital Media and Child Development
Eating Disorders Coalition
Electronic Privacy Information Center (EPIC)
LookUp.live
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Summary and Background

In this Petition for Rulemaking, the Center for Digital Democracy, Fairplay, Accountable Tech, American Academy of Pediatrics, Becca Schmill Foundation, Inc., Berkeley Media Studies Group, C. Everett Koop Institute at Dartmouth, Center for Humane Technology, Children and Screens: Institute of Digital Media and Child Development, Eating Disorders Coalition, Electronic Privacy Information Center (EPIC), LookUp.live, Lynn’s Warriors, Network for Public Education, Parent Coalition for Student Privacy, ParentsTogether, Protect Young Eyes, Public Citizen, Together for Girls, UConn Rudd Center for Food Policy and Health, and U.S. Public Interest Research Group (collectively, “Petitioners”) call upon the Federal Trade Commission (FTC) to promulgate a rule prohibiting the use of certain types of engagement-optimizing design practices on individuals under the age of 18 (“minors”). **When minors go online, they are bombarded by widespread design features that have been carefully crafted and refined for the purpose of maximizing the time users spend online and activities users engage in.** The FTC can and must establish rules of the road to clarify when these design practices cross the line into unlawful unfairness, thus protecting vulnerable users from unfair harms and restoring minors’ and families’ trust in the internet as a tool for minors to grow and prosper.

The internet holds tremendous potential to benefit minors and their families. Minors routinely use apps, websites, and other online services to attend and participate in school, complete their homework, research and learn about the world, explore their emerging identities, communicate with friends and loved ones, learn about and engage with the political process, develop professional skills for their eventual careers, and be entertained. Particularly in the years of the pandemic, many minors have relied heavily on online services to an unprecedented extent, spending more time online for school, social interactions, and entertainment. Minors should be able to engage in these valuable online activities without being harmed by the very providers of the services they use.

Unfortunately, minors and their families cannot be assured of the safety – or even the neutrality – of the online services they use. The goals of the apps, games, and services used by minors often are at odds with minors’ best interests. The vast majority of apps, games, and services that are popular among minors generate revenue primarily via advertising, and many employ sophisticated techniques to cultivate lucrative long-

term relationships between minors and their brands. As a result, developers have an interest in getting and keeping users on their products as much as possible. This conflicts with users' interest in an online experience that contributes to, rather than detracts from, their overall wellbeing.

To accomplish the goal of maximizing opportunities to generate ad revenue, apps, games, and services have developed – and are constantly tweaking, testing, and refining – sophisticated design features that maximize their users' time and activities online. We discuss numerous examples (such as autoplay, endless scroll, and strategically timed advertisements) of these widespread practices in this Petition. Such features serve the interests of platforms and advertisers, not children.

Design features like these often transform minors' online experience into a harmful one. As this Petition explains, design features that maximize time and activity online harm minors emotionally, developmentally, and physically. Minors themselves complain that they have difficulty extricating themselves from services designed to keep them engaged, and lament the social pressure they feel to produce and interact with content. Online engagement driven by these design features displaces sleep and physical activity, harming minors' health, growth, and academic performance. It can lead to what is known as “problematic internet use,” which is associated with a range of additional secondary harms. It exposes minors to potential predators and online bullies, as well as to age-inappropriate content. It harms minors' self-esteem and appears to aggravate risks of disordered eating and suicidality. And it encourages the disclosure of, and relies on the processing of, massive amounts of privacy-invasive user data.

A number of stories have emerged in recent years illustrating just how harmful these design practices can be. For example, the personalization of content (to keep users engaged), along with an autoplay function (to keep users continuously watching videos), led in 2019 to a six-year-old being shown an animated video encouraging suicide.² At their most extreme, these design features can be so appealing that they cause minors to form difficult-to-break habits that may lead to severe familial conflict, depression and anxiety, or even suicide. For example, last year, the family of Selena Rodriguez, a girl who died by suicide at the young age of 11, sued the makers of Facebook, Instagram, and Snapchat in a product liability complaint. The family alleged

² Rebecca Heilweil, *YouTube's Kids App Has a Rabbit Hole Problem*, Vox (May 12, 2021), <https://www.vox.com/recode/22412232/youtube-kids-autoplay>.

that design features of these products over two years led to a severe decline in Selena’s mental health, which culminated in her taking her own life.³

Despite mounting evidence that design features maximizing minors’ online time and activities are implicated in concrete and serious harms to minors, the design practices outlined in this Petition continue to bombard minors online. Minors cannot go online without encountering countless engagement-optimizing design practices. We focus in particular on three categories of these practices, defined and documented in detail in this Petition:

1. **Low-friction variable rewards design features.** These design features encourage compulsive behavior by rewarding minors unpredictably for merely scrolling, tapping, and/or logging onto a website or service in order to maximize a minor’s time on the service.
2. **Design features that manipulate navigation.** These design features make it difficult for minors to freely navigate or cease use of a website or service.
3. **Social manipulation design features.** These design features leverage a minor’s desire for social relationships to encourage greater time spent and/or activities performed on a website or service.

These harmful practices are widespread across numerous apps, games, and other services used by minors.

These particular categories of design practices are more than merely harmful to minors – they are unfair, in violation of Section 5 of the FTC Act. Minors have a variety of social, emotional, and psychological vulnerabilities relative to adults. This makes minors both particularly susceptible to, and particularly ill-equipped to avoid, the substantial harms caused by these practices. Nor can parents and guardians reasonably protect against these harms. In the modern era, not even the most attentive parents and guardians can possibly supervise their children’s every online moment and activity. Even if they could, confusing or misleading defaults and setting choices often frustrate parents’ and guardians’ best attempts to implement protective measures. Moreover, manipulative features such as navigation constraints are effectively invisible, since no

³ Adela Suliman, *Mother of 11-Year-Old Who Died by Suicide Sues Social Media Firms Meta and Snap*, Wash. Post (Jan. 22, 2022), <https://www.washingtonpost.com/nation/2022/01/22/selena-rodriguez-suicide-meta-snap-lawsuit/>.

alternative options are provided to users to choose from. This is why parents, public health professionals, and, indeed, the broader general public are all imploring policymakers to take action.

Market forces will not solve the problem; rather, market incentives create a “race to the bottom” whereby these features are proliferated by platforms competing with each other for market share and brand loyalty. The harmful externalities are passed onto kids, families, and society while companies and shareholders reap the rewards. A broadly applicable policy must be established to rein in these widespread unfair design practices that saturate the minor’s online experience.

Fortunately, the FTC is well-positioned to provide the necessary solution. The FTC Act vests the agency with ample authority to adopt rules prohibiting prevalent conduct that is unfair or deceptive. These conditions are plainly met here. Therefore, we call on the FTC to promulgate regulations to prohibit the use of design practices that maximize online engagement on minors.

In accordance with the FTC’s rules on petitions for rulemaking, this Petition sets forth below 1) a full statement of the factual and legal basis for the requested rulemaking, and 2) a full statement of the requested action, including the text and substance of the proposed rule.

Factual and Legal Basis for Requested Rulemaking

Under the FTC Act, the FTC has the authority to prescribe rules that “define with specificity . . . unfair or deceptive acts or practices in or affecting commerce,” which “may include requirements prescribed for the purpose of preventing such acts or practices,”⁴ where it has reason to believe that the unfair or deceptive acts or practices are prevalent.⁵ Petitioners urge the FTC to use this authority to promulgate a rule, the text of which is suggested below, prohibiting the use on minors of three particular types of design features that maximize users’ time and activities online. As Petitioners explain below, these categories of design features are unfair when used on minors, yet are prevalent in online services and sites used widely by minors.

Petitioners begin below by explaining how, in general, maximizing minors’ time and activities online causes substantial injury within the meaning of the FTC’s

⁴ 15 U.S.C. § 57a(a)(1)(B).

⁵ 15 U.S.C. § 57a(b)(3).

unfairness doctrine. As millions of exasperated parents are well aware, when minors are manipulated into spending more time and engaging in more activities online, this leads to a variety of concrete and serious psychological, emotional, and physical harms.

Petitioners next describe three categories of design features that are effective at maximizing users' time and activities online and are prevalent in apps, games, and other online services used by minors. For each category, Petitioners offer a suggested definition of the category, an explanation of how features in the category function to maximize users' time and/or activities online, and several examples illustrating the prevalence of the category. In addition, Petitioners explain how several of these categories of design features cause additional injuries to minors – injuries above and beyond those associated with minors' overall volume of time and activities online.

Finally, Petitioners provide additional analysis establishing the categorical unfairness of these types of design features. Not only are these design features the cause of substantial injury to minors, but neither minors nor their parents can reasonably avoid injury caused by these practices, and the harms caused by these design features outweigh any arguable countervailing benefits to minors or competition.

I. Design practices that maximize users' time and activities online cause substantial injury to minors.

In determining whether a practice is unfair, the FTC first looks to see whether the practice causes substantial injury.⁶ Under FTC policy, “[u]nwarranted health and safety risks may . . . support a finding of unfairness.”⁷ Indeed, design features that maximize minors' time and activities online are deeply harmful to minors' health and safety. As the Surgeon General has observed, “[b]usiness models are often built around maximizing user engagement as opposed to safeguarding users' health and ensuring that users engage with one another in safe and healthy ways This translates to technology companies focusing on maximizing time spent, not time well spent.”⁸ By maximizing time and activities online, the design features at issue in this Petition harm minors' mental health, foster problematic internet use by minors, damage minors'

⁶ Federal Trade Commission, Policy Statement on Unfairness (1980), <https://www.ftc.gov/legal-library/browse/ftc-policy-statement-unfairness>.

⁷ *Id.*

⁸ Protecting Youth Mental Health: The U.S. Surgeon General's Advisory 25 (2021), <https://www.hhs.gov/sites/default/files/surgeon-general-youth-mental-health-advisory.pdf>.

physical health, exacerbate minors' privacy harms, increase minors' risk of contact with dangerous or harmful people, and increase minors' exposure to age-inappropriate and otherwise harmful content.

A. Harm to overall mental health

Maximizing minors' time and activities online is linked with worse psychological wellbeing in minors in concrete and serious ways that cannot be ignored in the context of the current youth mental health crisis.

Heavy users of digital media are more likely to be unhappy, to be depressed, or to have attempted suicide.⁹ According to researchers reporting on the results of two nationally representative surveys of U.S. adolescents in grades 8 through 12, "the results show a clear pattern linking screen activities with higher levels of depressive symptoms/suicide-related outcomes and nonscreen activities with lower levels."¹⁰ The researchers reported that suicide-related outcomes became elevated after two hours or more a day of electronic device use.¹¹ Among teens who used electronic devices five or more hours a day, a staggering 48% exhibited at least one suicide risk factor.¹² Of particular concern, a large and growing body of research indicates a strong link between time spent on social media – some of the services most known for using engagement-maximizing techniques – and serious mental health challenges.¹³ Longer

⁹ Jean M. Twenge & W. Keith Campbell, *Media Use Is Linked to Lower Psychological Well-Being: Evidence from Three Datasets*, 90 *Psychol. Q.*, 311 (2019).

¹⁰ Jean M. Twenge et al., *Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time*, 6 *Clinical Psychol. Sci.* 3, 9 (2018). See also generally Jane Harness et al., *Youth Insight About Social Media Effects on Well/Ill-Being and Self-Modulating Efforts*, 71 *J. Adolescent Health*, 324-333 (Sept. 1, 2022); Amy Orben et al., *Windows of Developmental Sensitivity to Social Media*, 13 *Nature Comm.*, 1649 (2022).

¹¹ *Id.*

¹² *Id.*

¹³ See, e.g., K.E. Riehm et al., *Associations Between Time Spent Using Social Media and Internalizing and Externalizing Problems Among US Youth*, 76 *JAMA Psychiatry*, 1266 (2019), <https://doi.org/10.1001/jamapsychiatry.2019.2325>; N. McCrae et al., *Social Media and Depressive Symptoms in Childhood and Adolescence: A Systematic Review*, 2 *Adolescent Res. Rev.*, 315 (2017), <https://doi.org/10.1007/s40894-017-0053-4>; H. Allcott et al., *The Welfare Effects of Social Media*, 110 *Econ. Rev. Am.* 629 (2020), <https://www.aeaweb.org/articles?id=10.1257/aer.20190658>.

and more frequent social media use is associated with depression,¹⁴ anxiety,¹⁵ and suicide risk factors.¹⁶

Even if some of these documented associations are explained by children's underlying emotional challenges, the design features that are the subject of this Petition are likely to have differential negative effects on these youth. For example, children with more negative emotionality may seek endless scrolling as a means of dissociating from emotional distress,¹⁷ yet may be recommended more negative content based on their previous behavior.¹⁸ Minors with weaker impulse control may seek out video games as a satisfying activity, but may be more susceptible to the manipulative design patterns common in popular games, such as interaction-by-design (asking users to return to the game, even overnight, to obtain rewards), leading to less time sleeping.

B. Harm to body image

Design features that maximize time spent on social media can also lead to heightened exposure to negative body image-related content, which increases minors' susceptibility to poor body image and, consequently, disordered eating. A study of data from 7th and 8th graders published in 2019 in the *International Journal of Eating Disorders* "suggest[ed] that [social media], particularly platforms with a strong focus on image posting and viewing, is associated with elevated [disordered eating] cognitions and behaviors in young adolescents."¹⁹ In another study, researchers found a positive

¹⁴ Twenge & Campbell, *supra* note 9, at 312.

¹⁵ Royal Society for Public Health, *#StatusOfMind: Social Media and Young People's Mental Health and Wellbeing* 8 (May 2017).

¹⁶ Twenge & Campbell, *supra* note 9.

¹⁷ Amanda Baughan et al., "I Don't Even Remember What I Read": How Design Influences Dissociation on Social Media, CHI Conference on Human Factors in Computing Systems, 1-13 (2022), <https://dl.acm.org/doi/pdf/10.1145/3491102.3501899>.

¹⁸ Kait Sanchez, *Go Watch this WSJ investigation of TikTok's Algorithm*, The Verge, (July 21, 2021, 2:28 PM), <https://www.theverge.com/2021/7/21/22587113/tiktok-algorithm-wsj-investigation-rabbit-hole>.

¹⁹ Simon M. Wilksch et al., *The Relationship Between Social Media Use and Disordered Eating in Young Adolescents*, 53 *Int. J. Eat. Disord.* 96, 104 (2020).

correlation between higher Instagram use and orthorexia nervosa diagnoses.²⁰ Personal stories from sufferers of disordered eating have highlighted the link to social media.²¹

Time spent on social media can harm minors' body image and increase their susceptibility to disordered eating in multiple ways. First, visual social media platforms trigger social comparison as minors compare their appearance to others, including influencers. For example, an exploratory study performed internally at Meta concluded that 66% of teen girls on Instagram experienced negative social comparison, and 52% of those who experienced negative social comparison attributed this experience to viewing images on the platform that were related to beauty.²² The documents Frances Haugen shared with the *Wall Street Journal* in 2021 revealed that Facebook has been aware at least since 2019 that "[w]e make body image issues worse for one in three teen girls."²³ Haugen has explained how this becomes a vicious feedback cycle for minors: they feel bad about themselves so they go to social media for distraction in order to self-soothe, only to end up seeing the type of posts that led to their anxiety in the first place.²⁴ Negative self-comparison on social media is experienced by cisgender girls and boys; specifically, boys feel pressure to lose weight and build muscle as a result of the muscular men they see on TikTok, Instagram, and YouTube. Eliot, a 17-year-old, told the *New York Times*, "Girls discuss those pressures more, but it's completely the same for boys."²⁵

²⁰ Pixie G. Turner & Carmen E. Lefevre, *Instagram Use Is Linked to Increased Symptoms of Orthorexia Nervosa*, 22 *Eating Weight Disorders* 277, 281 (2017).

²¹ See, e.g., Jennifer Neda John, *Instagram Triggered My Eating Disorder*, *Slate* (Oct. 14, 2021), <https://slate.com/technology/2021/10/instagram-social-media-eating-disorder-trigger.html>; Clea Skopeliti, *'I Felt My Body Wasn't Good Enough': Teenage Troubles with Instagram*, *The Guardian* (Sept. 18, 2021), <https://www.theguardian.com/society/2021/sep/18/i-felt-my-body-wasnt-good-enough-teenage-troubles-with-instagram>.

²² *Spence v. Meta Platforms*, N.D. Cal. Case No. 3:22-cv-03294 at 9 (June 6, 2022) (citing Facebook Papers: "Teen Girls Body Image and Social Comparison on Instagram - An Exploratory Study in the US" (March. 2020), at p. 8).

²³ Georgia Wells et al., *Facebook Knows Instagram Is Toxic for Teen Girls, Company Documents Show*, *W.S.J.* (Sept. 14, 2021), <https://www.wsj.com/articles/facebook-knows-instagram-is-toxic-for-teen-girls-company-documents-show-11631620739>.

²⁴ Allison Slater Tate, *Facebook Whistleblower Frances Haugen Says Parents Make 1 Big Mistake with Social Media*, *TODAY* (Feb. 7, 2022, 7:06 PM EST), <https://www.today.com/parents/teens/facebook-whistleblower-frances-haugen-rcna15256>.

²⁵ Alex Hawgood, *What Is 'Bigorexia'?*, *N.Y. Times* (Mar. 5, 2022, updated May 17, 2022), <https://www.nytimes.com/2022/03/05/style/teen-bodybuilding-bigorexia-tiktok.html>.



A slide from an internal presentation at Meta indicates that “beauty”-related content on Instagram drives negative social comparison among teen girls.²⁶

Second, platforms use algorithms to deliver content related to topics or themes that the platform believes will maximize a user’s time spent on the platform. These recommendation systems create “bubbles” or “rabbit holes” of content around a specific theme and also expose users to increasingly extreme content on a given topic.²⁷ This has proven true for negative body image and pro-eating disorder content.²⁸ Indeed, research shows that social media platforms’ content selection algorithms have pushed disordered eating and harmful diet techniques to teenage girls.²⁹ Girls who express an interest in dieting or dissatisfaction with their looks are bombarded with content targeted to these insecurities and often pushed to more extreme content such as pro-anorexia posts and videos. And because platforms know teenage girls disproportionately engage with this type of content,³⁰ even minor users who do not

²⁶ *Teen Girls Body Image and Social Comparison on Instagram—An Exploratory Study in the U.S.*, W.S.J. at 9 (Sept. 29, 2021), <https://s.wsj.net/public/resources/documents/teen-girls-body-image-and-social-comparison-on-instagram.pdf>.

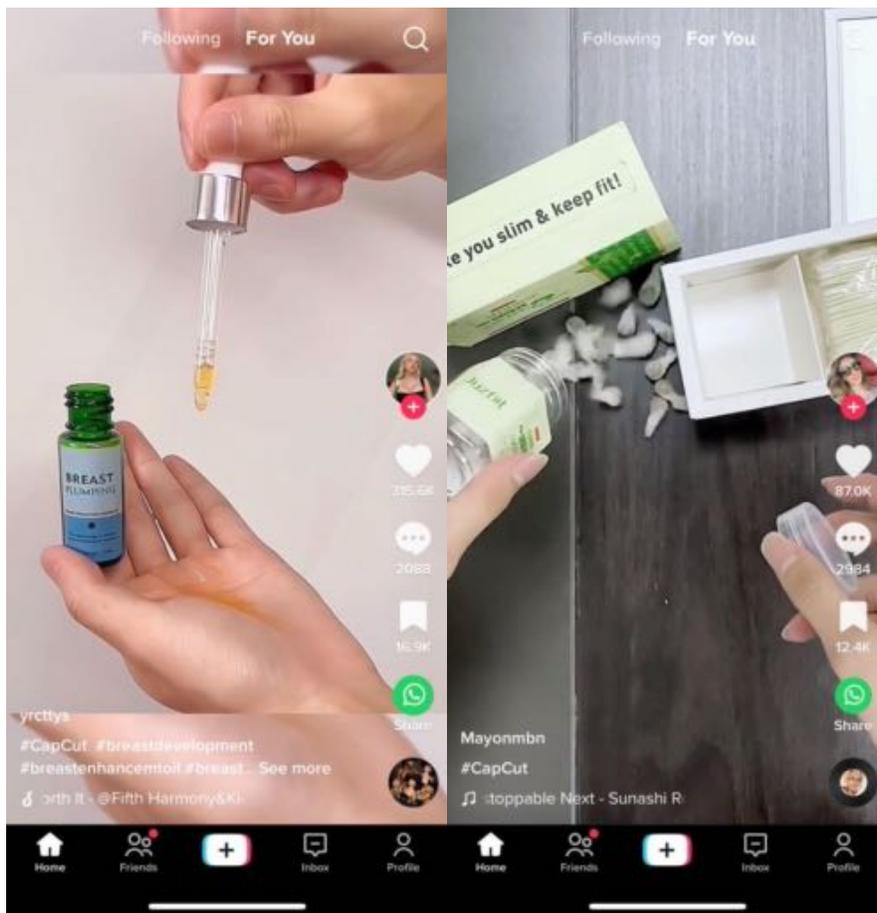
²⁷ Fairplay, *Designing for Disorder: Instagram’s Pro-eating Disorder Bubble* at 1 (Apr. 2022), https://fairplayforkids.org/wp-content/uploads/2022/04/designing_for_disorder.pdf; *Inside TikTok’s Algorithm: A WSJ Video Investigation*, W.S.J. (July 21, 2021), <https://www.wsj.com/articles/tiktok-algorithm-video-investigation-11626877477>.

²⁸ Fairplay, *supra* note 27, at 6-7.

²⁹ See generally *id.*; Jim Waterson & Alex Hern, *Instagram ‘Pushes Weight-Loss Messages to Teenagers’*, *The Guardian* (Jul 19, 2021, 7:01 AM), <https://www.theguardian.com/society/2021/jul/20/instagram-pushes-weight-loss-messages-to-teenagers>.

³⁰ See Fabrizio Bert et al., *Risks and Threats of Social Media Websites: Twitter and the Proana Movement*, 19 *Cyberpsychology, Behav. Soc. Networking* (Apr. 2016), <https://pubmed.ncbi.nlm.nih.gov/26991868/>.

express interest in these topics are often delivered this content. Indeed, when Petitioners registered a TikTok account for a fictitious 14-year-old, Petitioners quickly were fed videos advertising breast enhancement oil and weight loss patches – without having followed any other accounts or having searched for terms related to these topics.³¹



Petitioners registered a TikTok account as a 14-year-old. While scrolling through the app, Petitioners were shown ads for products related to breast enhancement and weight loss.³²

The harm that social media does to minors’ body image and eating habits has been widely discussed in public discourse in recent months, but even as of the filing of this Petition, content depicting disordered eating remains widely available to minors

³¹ We received these prompts on a TikTok account we created using the self-provided birthdate of August 17, 2008.

³² *Id.*

and profitable to platforms,³³ and even popular among teens, who are exposed to more of it as they spend more time online.

C. Risk of problematic internet use

Maximizing time and activities online also fosters “problematic internet use” – psychologists’ term for excessive internet activity that exhibits addiction, impulsivity, or compulsion.³⁴ Indeed, the design features discussed in this Petition plainly impede minors’ ability to put their devices down, even when they want to use them less. For example, a high school student told Common Sense Media,

One of the challenges I face with social media is getting off it. Once I get on, I have to really force myself off it because it’s so addictive. All I’m doing is scrolling, but I’m subconsciously looking for an end so I can feel accomplished. But the scrolling never stops.³⁵

Similarly, a teen told Harvard researchers Emily Weinstein and Carrie James she wants to cut back on her TikTok use, but finds it extremely difficult:

I can sit there for hours on end just scrolling through this app I can’t even count how many times I have fallen asleep on TikTok. It has taken over my life.³⁶

These teens’ experiences reflect those of the majority of their peers. A 2016 nationwide survey of minors ages 12 to 18 found that 61% of teens thought they spent too much time on their mobile devices, and 50% felt “addicted” to them.³⁷ In a 2022 Pew Research survey, 35 percent of teens said they are on YouTube, TikTok, Instagram,

³³ See generally Fairplay, *supra* note 27.

³⁴ Chloe Wilkinson et al., *Screen Time: The Effects on Children’s Emotional, Social, and Cognitive Development* at 6 (2021), <https://informedfutures.org/wp-content/uploads/Screen-time-The-effects-on-childrens-emotional-social-cognitive-development.pdf>.

³⁵ Katie Joseff, *Social Media Is Doing More Harm than Good*, Common Sense Media (Dec. 17, 2021), <https://www.commonsensemedia.org/kids-action/articles/social-media-is-doing-more-harm-than-good>.

³⁶ Emily Weinstein & Carrie James, *Behind Their Screens: What Teens Are Facing (And Adults Are Missing)*, MIT Press, at 31 (2022).

³⁷ Common Sense, *Dealing with Devices: Parents 10-11* (2016), https://www.commonsensemedia.org/sites/default/files/research/report/commonsense_dealingwithdevices-topline_release.pdf.

Snapchat, or Facebook “almost constantly.”³⁸ Over half of teens who describe being online or on social media “almost constantly” said they use social media platforms too much.³⁹

Research indicates that problematic internet use may disproportionately impact Black and Hispanic/Latino minors. Common Sense Media reports that white preteens (ages 8-12) average 4.5 hours of screen time use for entertainment daily, compared to Black preteens (6.5 hours) and Hispanic/Latino preteens (7 hours). Teenagers spend even more time online: white teens spend approximately 8 hours per day on screens for entertainment, and Black and Hispanic/Latino teens approximately 10 hours per day.⁴⁰ Fifty-six percent of Black teens and 55% percent of Hispanic teens describe being online “almost constantly,” compared with 37% of white teens.⁴¹

Problematic internet use, in turn, is linked to a host of additional problems. For example, in one study of 564 minors between the ages of 7 and 15 spearheaded by the Child Mind Institute in New York, researchers found that problematic internet use was positively associated with depressive disorders, Attention Deficit Hyperactivity Disorder, general impairment, and increased sleep disturbances.⁴² A meta-analysis of peer-reviewed studies involving cognitive findings associated with problematic internet use in both adults and adolescents found “firm evidence that PIU . . . is associated with cognitive impairments in motor inhibitory control, working memory, Stroop attentional inhibition and decision-making.”⁴³ Another study of over 11,000 European adolescents found that among teens exhibiting problematic internet use, 33.5% reported moderate to severe depression; 22.2% reported self-injurious behaviors such as cutting; and 42.3%

³⁸ Emily A. Vogels et al., *Teens, Social Media and Technology 2022*, Pew Research Center (Aug. 10, 2022), <https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022>.

³⁹ *Id.*

⁴⁰ Common Sense, *The Common Sense Census: Media Use by Tweens and Teens at 12* (2021), https://www.commonsensemedia.org/sites/default/files/research/report/8-18-census-integrated-report-final-web_0.pdf. These hours may include multitasking on several screens at once.

⁴¹ Vogels et al., *supra* note 38.

⁴² Restrepo et al., *Problematic Internet Use in Children and Adolescents: Associations with Psychiatric Disorders and Impairment*, 20 *BMC Psychiatry* 252 (2020), <https://doi.org/10.1186/s12888-020-02640-x>.

⁴³ Konstantinos Ioannidis et al., *Cognitive Deficits in Problematic Internet Use: Meta-Analysis of 40 Studies*, 215 *British Journal of Psychiatry* 639, 645 (2019), <https://pubmed.ncbi.nlm.nih.gov/30784392/>.

reported suicidal ideation.⁴⁴ The incidence of attempted suicide was also ten times higher for teens exhibiting problematic internet use than their peers who exhibited healthy internet use.⁴⁵

D. Harm to physical health

Maximizing minors' time spent online at the expense of sleep or movement also harms minors' physical health. When minors are driven to spend more time online, they sleep less – because it is impossible to be online and sleep at the same time, because stimulation before bedtime disrupts sleep patterns, and because many of the design features discussed in this Petition make users feel pressured to be connected constantly, and that feeling doesn't always go away at nighttime. Indeed, research shows that minors who exhibit problematic internet use often suffer from sleep problems.⁴⁶ One-third of teens say that at least once per night, they wake up and check their phones for something other than the time, such as to check their notifications or social media.⁴⁷ Some teens set alarms in the middle of the night to remind them to check their notifications or complete video game tasks that are only available for a limited time.⁴⁸ In addition, screen time before bed is known to inhibit academic performance in minors.⁴⁹ Teenagers who use social media for more than five hours per day are about 70% more likely to stay up late on school nights.⁵⁰ A lack of sleep in teenagers has been linked to inability to concentrate, poor grades, drowsy-driving incidents, anxiety, depression, thoughts of suicide, and even suicide attempts.⁵¹

Decades of research have shown that more time online is consistently correlated with minors' risk of obesity, which in turn increases their risk of serious illnesses like

⁴⁴ Michael Kaess et al., *Pathological Internet use among European adolescents: psychopathology and self-destructive behaviours*, 23 *Eur. Child & Adolescent Psychiatry* 1093, 1096 (2014), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4229646/>.

⁴⁵ *Id.*

⁴⁶ Restrepo et al., *supra* note 42.

⁴⁷ Common Sense, *Screens and Sleep: The New Normal: Parents, Teens, Screens, and Sleep in the United States* at 7 (2019), <https://www.commonsensemedia.org/sites/default/files/research/report/2019-new-normal-parents-teens-screens-and-sleep-united-states-report.pdf>.

⁴⁸ Weinstein & James, *supra* note 36, at 38.

⁴⁹ Wilkinson et al., *supra* note 34, at 4.

⁵⁰ *Heavy Social Media Use Linked to Poor Sleep*, BBC News (Oct. 23, 2019), <https://www.bbc.com/news/health-50140111>.

⁵¹ *Among teens, sleep deprivation an epidemic*, Stanford News Ctr. (Oct. 8, 2015), <https://med.stanford.edu/news/all-news/2015/10/among-teens-sleep-deprivation-an-epidemic.html>.

diabetes, high blood pressure, heart disease, and depression.⁵² Spending time online displaces time when minors could be engaging in physical activity.⁵³ Further, when minors spend more time online, they are exposed to more advertisements for unhealthy products,⁵⁴ which are heavily targeted toward minors.⁵⁵ In addition, poor sleep quality – which, as discussed above, is associated with problematic internet use – increases the risk of childhood obesity by 20%.⁵⁶



A Twizzlers ad plays on YouTube. This particular ad was encountered before viewing a Minecraft-related video.

⁵² Jeff Chester et al., *Big Food, Big Tech, and the Global Childhood Obesity Pandemic* at 3 (2021), https://www.democraticmedia.org/sites/default/files/field/public-files/2021/full_report.pdf.

⁵³ E de Jong et al., *Association Between TV Viewing, Computer Use and Overweight, Determinants and Competing Activities of Screen Time in 4- to 13-Year-Old Children*, 37 *Int'l J. Obesity* 47, 52 (2013), <https://pubmed.ncbi.nlm.nih.gov/22158265/>.

⁵⁴ *Id.*

⁵⁵ Chester et al., *supra* note 52.

⁵⁶ Yanhui Wu et al., *Short Sleep Duration and Obesity Among Children: A Systematic Review and Meta-Analysis of Prospective Studies*, 11 *Obesity Rsch. & Clinical Prac.* 140, 148 (2015), <https://pubmed.ncbi.nlm.nih.gov/27269366/>; Michelle A. Miller et al., *Sleep Duration and Incidence of Obesity in Infants, Children, and Adolescents: A Systematic Review and Meta-Analysis of Prospective Studies*, 41 *Sleep* 1, 15 (2018), <https://pubmed.ncbi.nlm.nih.gov/29401314/>.

E. Harm to privacy

Design features that maximize minors' time and activities online also exacerbate privacy harms. Like all users, minors are tracked as they engage in online activities.⁵⁷ Data about what minors do online is collected by a vast network that includes platforms, marketers, and third-party data brokers that use the information apps, websites, and services collect and retain about minors to profile them, make predictions about their choices, and influence their behavior. As the Center for Digital Democracy and Fairplay will outline in their forthcoming comments on the Commission's Advanced Notice of Proposed Rulemaking on commercial surveillance, children and teenagers do not developmentally understand digital privacy. The constant surveillance they are subjected to as a result of these techniques is manipulative, limits creativity and experimentation, and perpetuates discrimination, substantially harming children and teens.

II. Design practices that maximize minors' time and activities online are prevalent.

Maximizing minors' time and activities online harms them in a variety of concrete and serious ways, but when minors use digital platforms, they are nevertheless besieged with features designed to maximize online time and activities. In the absence of FTC intervention, minors will continue to encounter these features everywhere, and the manipulation tactics will continue to become more extreme.⁵⁸

The FTC can promulgate rules defining acts or practices that are unfair or deceptive where it has "reason to believe that the unfair or deceptive acts or practices which are the subject of the proposed rulemaking are prevalent."⁵⁹ Petitioners urge the

⁵⁷ See, e.g., Reyes et al., "Won't Somebody Think of the Children?" *Examining COPPA Compliance at Scale*, 3 Proceedings on Privacy Enhancing Technologies 63, at 77 (2018), <https://blues.cs.berkeley.edu/blog/2018/04/25/wont-somebody-think-of-the-children-examining-coppa-compliance-at-scale/> (finding that out of 5,855 child-directed apps, roughly 57% were collecting personal information in potential violation of the Children's Online Privacy Protection Act).

⁵⁸ Compare Marisa Meyer et al., *Advertising in Young Children's Apps: A Content Analysis*, 40 *Journal of Developmental and Behavioral Pediatrics* (Aug. 2018), https://www.childrenstech.com/files/2018/11/Advertising_in_Young_Children_s_Apps__A_Content.99257.pdf, with Jenny Radesky et al., *Prevalence and Characteristics of Manipulative Design in Mobile Applications Used by Children*, 5 *JAMA Network Open* 1 (June 17, 2022), <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2793493>.

⁵⁹ 15 U.S.C. § 57a(b)(3).

FTC to use this authority to prohibit three categories of engagement-optimizing design features that are categorically unfair: low-friction variable rewards design features, navigation manipulation design features, and social manipulation design features.⁶⁰ Petitioners discuss these categories in turn below. For each category Petitioners offer a definition; explain how design features that fall in the category function to maximize minors' time and activities online; illustrate the category's prevalence across websites, services, games, and apps used by minors; and discuss further harms – beyond those that flow generally from increasing time and activities online – caused by design features in the category.

In addition to the examples given throughout this Petition, Petitioners have attached an appendix that further illustrates the prevalence of these unfair engagement maximization features across a plethora of apps targeting minors.⁶¹ The appendix, compiled as an informal study by Petitioners, includes over 80 examples of these practices in games and social media apps.

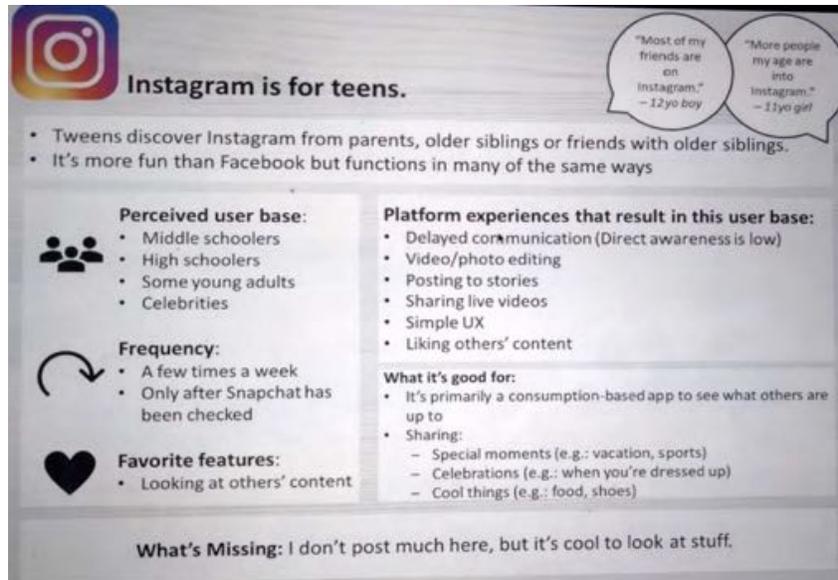
Of note, this Petition does not focus solely on sites and services that are obviously designed for and directed to minors. In an effort to establish prevalence, Petitioners includes examples taken from digital platforms that are used by both minors and adults. This is because regardless of whether or not a site or service is obviously child-directed, minors suffer harm as a result of these design features, and many of these features are widespread across sites and services that are used by adults and also heavily used by minors. For example, as Petitioners illustrate below, many of these design features are particularly prevalent in social media services, many of which are extremely popular among minors. According to internal research by Meta – Facebook's and Instagram's parent company – by 2016, “[t]he majority of 10–12 year olds [had] at least one social media account.”⁶² A slide from a 2017 internal presentation at Meta states “Instagram is for teens,” describes the perceived user base as primarily middle schoolers and high schoolers, and includes quotes from 11- and 12-year-olds saying that people their age use Instagram.⁶³

⁶⁰ These types of harmful design features, though distinct, are not mutually exclusive, and some common design features fall into multiple categories.

⁶¹ See generally Appendix.

⁶² Spence v. Meta Platforms, *supra* note 22, at 68.

⁶³ *Id.*



A 2017 internal presentation at Meta indicates that the company thinks of Instagram as a product for tweens and teens.⁶⁴

In 2021, 57% of surveyed American minors ages 12–17 said they used Instagram every week, and 63% said they used TikTok every week.⁶⁵ YouTube was the most popular social media platform among American adolescents in 2021; 72% said they used the service every week.⁶⁶ Last year, 13% of surveyed children ages 8- to 12-year-olds used Snapchat, 10% used Instagram, and 8% used Facebook.⁶⁷ This year, 95% of surveyed American teens ages 13-17 reported using YouTube, and 19% of surveyed American teens reported using YouTube “almost constantly.”⁶⁸ Second most popular was TikTok, with 67% using the platform, and 16% using TikTok “almost constantly.”⁶⁹ Nearly tied, 62% and 59% of teens reported using Instagram and Snapchat, respectively, with 10% of teens reporting almost constant use of Instagram and 15% reporting almost constant use of Snapchat.⁷⁰ Finally, 32% of teens reported using Facebook.⁷¹

⁶⁴ *Id.*

⁶⁵ Salvador Rodriguez, *TikTok usage surpassed Instagram this year among kids aged 12 to 17, Forrester survey says*, CNBC (Nov. 18, 2021, 5:51 PM EST), <https://www.cnbc.com/2021/11/18/tiktok-usage-topped-instagram-in-2021-among-kids-12-to-17-forrester-.html>.

⁶⁶ *Id.*

⁶⁷ Common Sense, *supra* note 40 at 5.

⁶⁸ Vogels et al., *supra* note 38.

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ *Id.*

These design practices also are prevalent both in games that are obviously minors' games⁷² and in games rated for older audiences that are played by large numbers of minors. For example, a popular game for teens and even younger minors, Fortnite, which receives a "T" (for "teen") rating from the ESRB, is played by large numbers of younger minors.⁷³ According to a 2019 study, more than 25% of preteens in the US play Fortnite.⁷⁴

The unfair and deceptive practices specified in this Petition are prevalent in part because they are integral to gaming and social media companies' business model. The gaming industry and social media platforms' practices intentionally target minors in order to maximize data collection and ad revenue. First and foremost, gaming app companies employ teams of specialists who focus at each stage in the game's development on cost-efficient user acquisition and long-term player retention.⁷⁵ Each of the big social media platforms (Meta (Facebook and Instagram), Google (YouTube), and TikTok) have both in-house and external research initiatives designed to document and improve engagement reporting and have projects that use neuromarketing and virtual reality techniques to measure effectiveness.⁷⁶ The mobilization of all of these resources

⁷² See, e.g., Jenny Radesky et al., *Prevalence and Characteristics of Manipulative Design in Mobile Applications Used by Children*, 5 JAMA Network Open 1 (2022), <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2793493>.

⁷³ See David Chapman, *Fortnite Game Review*, Common Sense Media (last updated Sept. 30, 2021), <https://www.common Sense Media.org/game-reviews/fortnite>; Edward C. Baig, *'Fortnite': How Young Is Too Young to Play?*, USA Today (Feb. 26, 2019), <https://www.usatoday.com/story/tech/2019/02/26/parents-guide-fortnite-how-old-too-young-let-kids-play/2800065002/>.

⁷⁴ See Nestor Gilbert, *78 Essential Fortnite Statistics: 2022 Users & Revenue Data*, FinancesOnline (last updated Nov. 5, 2022), <https://financesonline.com/fortnite-statistics/>.

⁷⁵ See, e.g., *Leading User Acquisition in the quickly growing mobile games industry: Get to know Winnie Wen of Jam City*, Jam City (Nov. 15, 2021), <https://www.jamcity.com/leading-user-acquisition-in-the-quickly-growing-mobile-games-industry-get-to-know-winnie-wen-of-jam-city/>; *Mediation that supports everything your app business needs to scale*, ironSource, <https://www.is.com/mediation/>; Mihovil Grguric, *15 Key Mobile Game Metrics That Developers MUST Track*, udonis (Sept. 20, 2022), <https://www.blog.udonis.co/mobile-marketing/mobile-games/key-mobile-game-metrics>.

⁷⁶ See, e.g., Meta Careers, *Shape the Future of Marketing with the Marketing Science Team*, Meta (Sept. 19, 2018), <https://www.metacareers.com/life/come-build-with-the-facebook-marketing-science-team/>; Bob Arnold & Anton Miller, *How Google's Media Lab Boosts YouTube Ad Results*, AdAge (May 14, 2021), <https://adage.com/article/google/how-googles-media-lab-boosts-youtube-ad-results/2335796>; *TikTok Insights*, TikTok for Business (2022), <https://www.tiktok.com/business/en-US/insights>; *TikTok Ads Break Through Better than TV and Drive Greater*

indicates that websites, apps, and services are built not for gameplay or user experience, but for maximization of profit.

For example, Hello Kitty Nail Salon’s Budge Studios, now owned by Tilting Point, uses machine learning to optimize offers and ads and build a steady wave of engaged players.⁷⁷ Games also deploy an array of metrics to define and structure gameplay in order to generate revenue.⁷⁸ The same is true of social media. All the major platforms provide both content creators and marketers with an array of internally developed and assessed measures designed to trigger, track and document the performance of a variety of suggested digital interactions. For example, TikTok offers marketers a massive array of data about the advertisements they run on the platform, including the number of people who watched 25%, 50%, 75%, or 100% of an ad; the total number of people who clicked an ad and added something to a shopping cart; and the total value of all of those shopping carts.⁷⁹ TikTok also provides advertisers tools to target audiences with precision—a marketer can target up to 400 “custom” audiences at one time.⁸⁰ Google offers YouTube creators and marketers a variety of metrics tied to the delivery of financially related transactions, such as the purchasing of products, generating subscriptions and forms of payment.⁸¹ This drive for engagement from both the gaming and social media platform industries has meant the rapid expansion of harmful manipulative design practices.

Audience Engagement, TikTok for Business, <https://www.tiktok.com/business/library/TikTokDrivesGreaterAudienceEngagement.pdf>; *How Virtual Reality Facilitates Social Connection*, Meta, <https://www.facebook.com/business/news/insights/how-virtual-reality-facilitates-social-connection>.

⁷⁷ *Tilting Point’s Proprietary Technology*, Tilting Point (2021), <https://www.tiltingpoint.com/what-we-do/our-tech/>; *Tilting Point Acquires Budge Studios, Expanding into Kids Entertainment*, Business Wire (Mar. 16, 2022, 10:00 AM EST), <https://www.businesswire.com/news/home/20220316005291/en/Tilting-Point-Acquires-Budge-Studios-Expanding-Into-Kids-Entertainment>.

⁷⁸ Jonathan Fishman, *The Complete App Store Optimization (ASO) Guide* (2022), Storemaven (Sept. 27, 2021), <https://www.storemaven.com/academy/app-store-optimization-guide/>; Aysu Burak, *5 Tips for Critical KPIs*, Mobidictum (Oct. 29, 2021), <https://mobidictum.biz/5-tips-for-critical-kpi-crazylabs/>.

⁷⁹ *All Metrics*, TikTok Business Help Center, <https://ads.tiktok.com/help/article?aid=10000165>.

⁸⁰ *Engagement*, TikTok Business Help Center, <https://ads.tiktok.com/help/article?aid=6721963298155134982>.

⁸¹ *Measure key moments for audience retention*, YouTube Help, <https://support.google.com/youtube/answer/9314415?hl=en>.

Accordingly, Petitioners establish the prevalence of these practices by examining platforms popular with minors as well as those widely used across age groups. The prevalence of each category of design feature is addressed in turn.

A. Low-friction variable rewards

The first type of design practice that Petitioners urge the FTC to recognize as categorically unfair when used on minors is the low-friction variable reward.

Petitioners define this design practice category as:

(a) Low-Friction Variable Rewards.

- (i) Rewarding content or virtual items offered by a website or service that:
 - (1) Are awarded to users for mere scrolling, tapping, and/or opening or logging into the website or service;
 - (2) Vary unpredictably in type, amount, and/or timing; and
 - (3) Generally increase as a minor spends more time on the website or service, or visits it more frequently.
- (ii) Examples of prohibited variable reward design features include:
 - (1) **Endless Scroll and Autoplay with Variable Content.** Variable content loaded continuously without interruptions or pauses.
 - (2) **Variable Reward Notifications and Nudges.** Notifications and nudges that do not originate from a minor's individual connections or preferences on an online website or service that encourage minors to return to the online website or service at variable intervals to receive a reward.

Low-friction variable rewards are highly effective at maximizing the amount of time users spend on the service. The psychological technique that renders these features effective is based on research that predates the internet by many years,⁸² beginning with experiments by famous psychologist B.F. Skinner in the first half of the 20th Century.⁸³ Research by Skinner and others revealed that when test subjects – both humans and other animals – are rewarded unpredictably for a given action, they will engage in the

⁸² J. E. Staddon & D. T. Cerutti, *Operant Conditioning*, 54 Annual Review of Psychology 115-144 (2003), <https://doi.org/10.1146/annurev.psych.54.101601.145124>.

⁸³ B. F. Skinner, *Two Types of Conditioned Reflex: A Reply to Konorski and Miller*, 16 J. Gen. Psychology, 272-279 (1937), <https://doi.org/10.1080/00221309.1937.9917951>.

action for a longer period of time than if the reward is predictable.⁸⁴ At a chemical level, this is because the brain generates more dopamine in response to an uncertain reward than in response to an expected and reliable one.⁸⁵ The tendency of variable rewards to drive compulsive behavior is sometimes referred to as the “Vegas Effect,” and is the primary mechanism at work in slot machines, keeping players sitting in front of machines for hours on end.⁸⁶

Design features that incorporate variable rewards have been utilized and refined by online services for years to drive engagement. In the words of Nir Eyal, a consumer psychology expert who wrote the popular industry how-to *Hooked: How to Build Habit-Forming Products*, “[v]ariable schedules of reward are one of the most powerful tools that companies use to hook users.”⁸⁷ Today, some platforms use machine learning technologies to fine-tune variable rewards to ensure maximum appeal to each user.⁸⁸ For the reasons outlined in Section III.B below, minors are particularly vulnerable to these reward systems.⁸⁹

One common example of variable rewards design feature is the infinite or **endless scroll mechanism** with variable content that is deployed across social media services. When a platform uses endless scroll, a user is continuously fed more pieces of content, with no endpoint, as they scroll down a feed or page. When services load content into streams viewed by endless scroll, a user can never predict what will come next or how interesting it will be. The user is rewarded at unpredictable intervals and

⁸⁴ Laura MacPherson, *A Deep Dive into Variable Designs and How to Use Them*, DesignLi (Nov. 8, 2018), <https://designli.co/blog/a-deep-dive-on-variable-rewards-and-how-to-use-them/>; Mike Brooks, *The "Vegas Effect" of Our Screens*, Psychol. Today (Jan. 4, 2019), <https://www.psychologytoday.com/us/blog/tech-happy-life/201901/the-vegas-effect-our-screens>.

⁸⁵ Anna Hartford & Dan J. Stein, *Attentional Harms and Digital Inequalities*, 9 JMIR Mental Health 2, 3 (Feb. 11, 2022), <https://pubmed.ncbi.nlm.nih.gov/35147504/> (“At the level of our neural reward system, an uncertain reward generates a more significant dopamine response than those generated by a reliable reward.”).

⁸⁶ Brooks, *supra* note 84.

⁸⁷ Nir Eyal, *The Hook Model: How to Manufacture Desire in 4 Steps*, Nir and Far, <https://www.nirandfar.com/how-to-manufacture-desire/>.

⁸⁸ Hartford & Stein, *supra* note 85 (“On prominent internet platforms, sophisticated machine learning technologies now endeavor to randomize rewards for each user.”). The collection of data to inform these machine learning technologies may in turn be used to fuel targeted marketing. *Id.*

⁸⁹ See discussion *infra* Section III.B, “Minors lack the developmental maturity necessary to protect themselves from design features that maximize engagement.”

levels with pieces of content they find funny, entertaining, or otherwise interesting.⁹⁰ Harvard researchers Emily Weinstein and Carrie James explain in their recent book on teens and technology: “Apps like TikTok have an endless database of content to offer users. Some videos are pointless or boring or upsetting; others give a fleeting reward in the form of funny, relatable, or compelling content.”⁹¹ The pursuit of the next “rewarding” piece of content keeps kids scrolling. Highlighting both the low-friction and variable nature of Snapchat, one 16-year-old told the researchers that Snapchat is “so addictive because it’s so easy to go on to the next thing And you never know what amazing thing could be on the next Story, and all you have to do is tap once and you get to the next thing.”⁹²

All popular social media platforms, including those used heavily by minors such as TikTok, Snapchat, Instagram, and Facebook, feature endless scroll. These platforms supply minor users with unpredictable variable rewards by strategically and intermittently surfacing content that users are predicted to engage with. For example, an internal document from TikTok explains that the service presents content to users to maximize for two closely related metrics: user retention (the likelihood that a user will return) and time spent on the platform.⁹³ In a video on YouTube, a product manager for YouTube’s recommendation system explains that the platform’s recommendation algorithm “is designed to do two things: match users with videos they’re most likely to watch and enjoy, and . . . recommend videos that make them happy. . . . [S]o our viewers keep coming back to YouTube, because they know that they’ll find videos that they like there.”⁹⁴ A blog post by Adam Mosseri, head of Instagram, explains, “[W]e make a set of predictions. These are educated guesses at how likely you are to interact with a post in different ways. . . . The more likely you are to take an action, and the more heavily we weigh that action, the higher up you’ll see the post.”⁹⁵

⁹⁰ GCFGlobal.org, *Digital Media Literacy: Why We Can’t Stop Scrolling*, <https://edu.gcfglobal.org/en/digital-media-literacy/why-we-cant-stop-scrolling/1/>.

⁹¹ Weinstein & James, *supra* note 36, at 33.

⁹² *Id.* at 34.

⁹³ Ben Smith, *How TikTok Reads Your Mind*, N.Y. Times, (Dec. 5, 2021), <https://www.nytimes.com/2021/12/05/business/media/tiktok-algorithm.html>.

⁹⁴ Creator Insider, *Behind the Algorithms - How Search and Discovery Works on YouTube*, YouTube (Apr. 16, 2021), <https://youtu.be/9Fn79qJa2Fc>.

⁹⁵ Adam Mosseri, *Shedding More Light on How Instagram Works*, Instagram (June 8, 2021), <https://about.instagram.com/blog/announcements/shedding-more-light-on-how-instagram->

The companies that operate these platforms are aware of the value of variable rewards for driving users' online time and maximizing profits, as well as the risks associated with these types of rewards. For example, in 2020, responding to internal research indicating that teen users had difficulty controlling their use of Facebook and Instagram, a Meta employee wrote to a colleague:

I worry that the driving [users to engage in more frequent] sessions incentivizes us to make our product more addictive, without providing much more value. How to keep someone returning over and over to the same behavior each day? Intermittent rewards are the most effective (think slot machines), reinforcing behaviors that become especially hard to extinguish.⁹⁶

Amid public concern regarding teenagers' social media use and in particular following the revelations by whistleblower Frances Haugen, companies have begun to deploy some countervailing measures, but it is unknown whether these measures are effective, and in any event, these measures do not resolve the crux of the problem. For example, at the end of 2021 Instagram introduced a new feature called "Take A Break" that, when turned on, prompts users to take a break after they have been continuously scrolling for a certain amount of time.⁹⁷ A similar feature was already offered on YouTube,⁹⁸ which autoplays variable content in a design feature that functions in a psychologically similar way to the endless scroll. TikTok also recently introduced some new features that prompt users who spend more than 100 minutes in the app in a single

works ("[W]e make a set of predictions. These are educated guesses at how likely you are to interact with a post in different ways. . . . The more likely you are to take an action, and the more heavily we weigh that action, the higher up you'll see the post.").

⁹⁶ Spence v. Meta Platforms, *supra* note 22, at 82.

⁹⁷ Adam Mosseri, *Raising the Standard for Protecting Teens and Supporting Parents Online*, About Instagram (Dec. 7, 2021), <https://about.instagram.com/blog/announcements/raising-the-standard-for-protecting-teens-and-supporting-parents-online>. Instagram recently updated the Take A Break feature to integrate messages from popular content creators into the break reminders. Andrew Hutchinson, *Instagram Adds New Prompts to Reduce Harmful Impacts on Young Users*, Social Media Today (June 14, 2022), <https://www.socialmediatoday.com/news/instagram-adds-new-prompts-to-reduce-harmful-impacts-on-young-users/625512/>.

⁹⁸ *Take a Break Reminder*, YouTube Help, <https://support.google.com/youtube/answer/9012523>.

day to take a break.⁹⁹ But these features do little to limit the allure of endless scroll because users can simply hit “dismiss” when reminders appear on the screen. Hence, such features merely constitute single points of friction that do not alter the overall low-friction nature of endless scroll. Further, these features are only turned on by default for users aged 13-17 on YouTube, so users must opt-in to the feature via their account activity settings. Ultimately, these optional, opt-in reminders – which also are not available on all platforms¹⁰⁰ – are an insufficient solution to the allure of endless scroll.

Low-friction variable rewards also appear with great frequency in games to keep players hooked. In general, variable rewards in games often appear in the form of chests or similar items containing virtual items that can be used in the game.



In the popular game “SpongeBob: Krusty Cook-Off” from Tilting Point LLC, the player is periodically given rewards chests containing a variety of in-game items.

⁹⁹ Jordan Furlong, *Investing in Our Community's Digital Well-Being*, TikTok Newsroom (June 9, 2022), <https://newsroom.tiktok.com/en-us/investing-in-our-communitys-digital-well-being>.

¹⁰⁰ Sarah Perez, *Amid Growing Concerns Around App Addiction, TikTok Rolls out More Screen Tools*, TechCrunch (June 9, 2022, 3:00 AM EDT), <https://techcrunch.com/2022/06/09/amid-growing-concerns-around-addiction-tiktok-rolls-out-more-screen-tools/>.



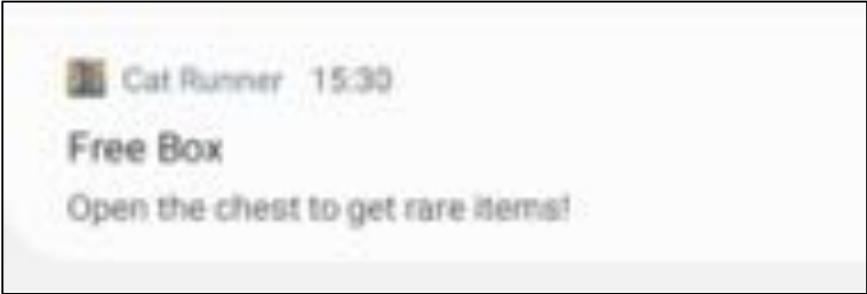
In the popular game “My Talking Tom” from Outfit7 Limited, the player can spin a wheel every day to receive a free random reward. The player receives additional spins if they watch an ad.



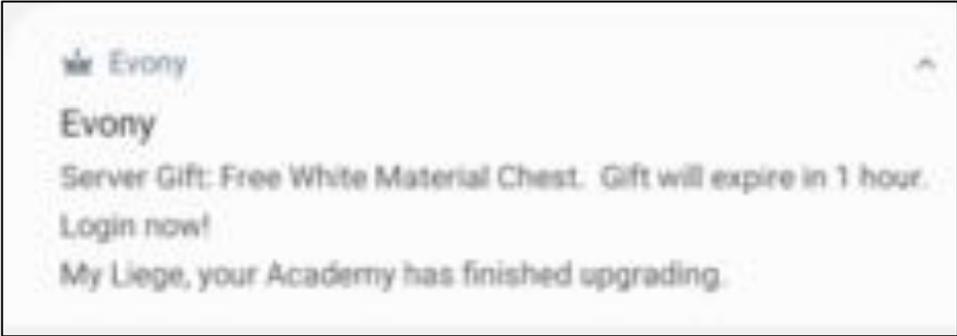
“Star Wars: Galaxy of Heroes” from Electronic Arts features bronzium data cards that offer the player variable rewards.

Another common example of the habit-forming low-friction variable rewards category of design practice is the **variable reward notification or nudge**, which appears at variable intervals and urges a user to return to an online service to receive a reward.

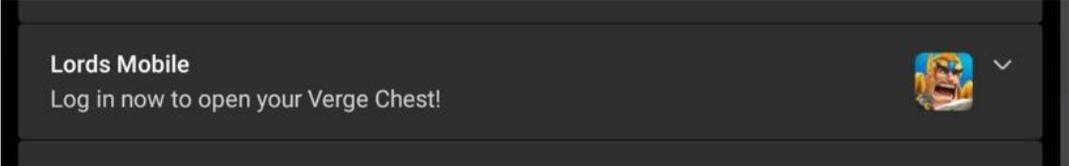
Such notifications or nudges are common in games and services used by minors. These nudges encourage minors to return to a platform when they may not have intended to do so, and some entice users with time-limited offers that are designed to create a sense of urgency around returning to the game.



In the popular game “Cat Runner” from Ivy, the player periodically receives phone notifications to return to the app and open a free box with variable rewards.



The popular game “Evony: The King’s Return” from TG Inc. regularly notifies the player about free chests with variable rewards, prompting the user to return to the game before they expire.



In “Lords Mobile” from I Got Games (IGG), periodic notifications are given to open ‘Verge Chests’ to unlock free variable rewards. See Appendix for more examples of Low-Friction Variable Rewards.

B. Navigation manipulation

The second type of design practice that Petitioners urge the FTC to recognize as categorically unfair when used on minors is navigation manipulation. Petitioners define this design practice category as:

(a) Navigation Manipulation.

(i) Design features that:

- (1) Make it difficult for a minor to navigate out of a content stream or exit an online website or service; or
- (2) Encourage seamless and continuous use of a website or service without any stopping cue(s);
- (3) Except when the primary function is to instruct minors on the functionality of, or offer narrative information central to, the website or service.

(ii) Examples of prohibited navigation manipulation design features include:

- (1) **Difficult Navigability.** Features that make it difficult for minors to maneuver out of a content stream or back to the home screen without viewing additional content.
- (2) **Autoplay.** Functionality that makes the next piece of content play automatically, without requiring an action from the minor.
- (3) **Strategically Timed Advertisements.** Advertisements that pop up when a minor attempts to navigate to another part of the website or online service, such as back to the main menu, on to another round of a game, or out of the website or online service altogether.

Online services widely use a variety of tools to manipulate navigation—impeding the user’s ability to navigate a website or app to their desired destination—in order to prolong user engagement. Some design features in this category manipulate navigation in a way that makes it harder for a user to leave the service. Other design features in this category undermine user autonomy by manipulating navigation in a way that encourages the user to continue engaging in certain user activities that are beneficial for the platform, such as manipulating users to watch advertisements.

Some common examples of navigation manipulation practices commonly used on minors include **autoplay and strategically timed advertisements**. These techniques make it hard for a minor to navigate the online website or service because they either keep the minor on one content stream, increasing time on a device (autoplay) so as to

exclude other content, or they block the minor from moving forward (pop-up advertisements).

Even more intrusive navigation manipulation techniques include design features that lock an app's screen and force a user to watch a video or exit the app. Interactive advertisements go even further, compelling a user to click or "play" in an ad in order to continue gameplay. These are all forms of navigation manipulation because they force a player to watch a video or "play a game" while still being an ad. Neither the video nor the "game" is a part of the actual service (i.e., an app or game), yet it keeps the user on if they desire to continue to use the service.

Navigation manipulation design features are widespread in games used by minors. For example, many games frequently inject ads in the middle of gameplay that the user must watch in order to continue.



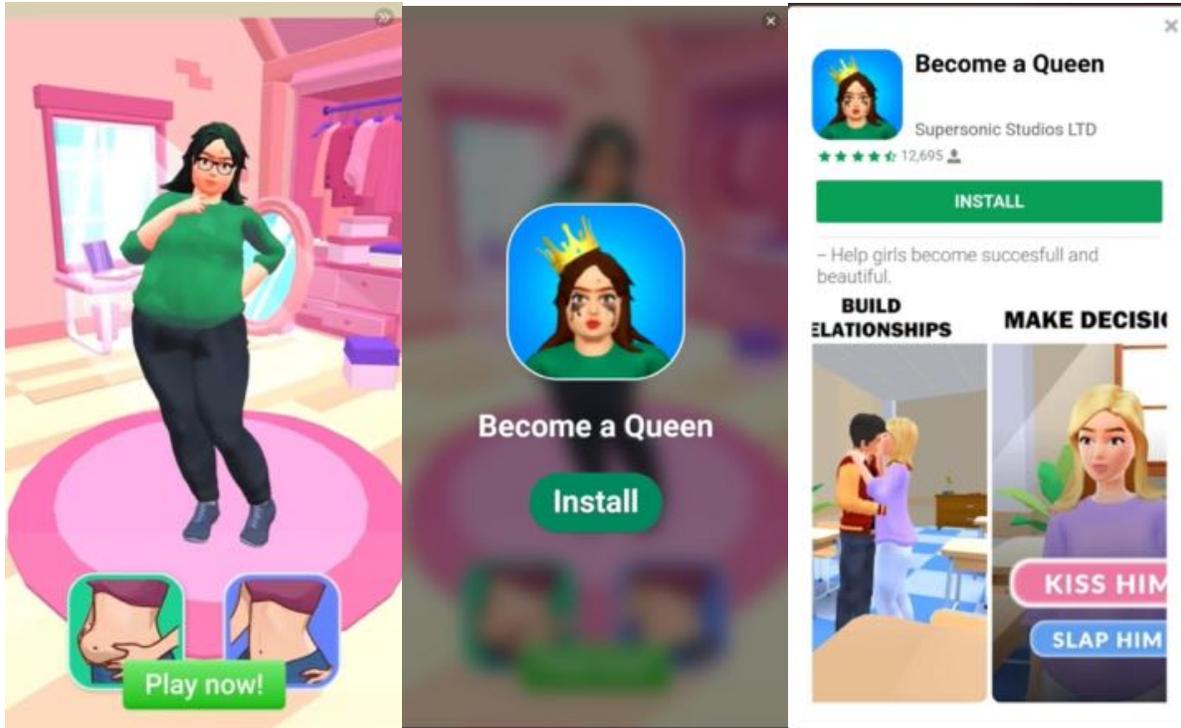
In the game "Miss Hollywood: Vacation" from Budge, immediately after earning a prize, the player must view a video ad for another Budge game for approximately five seconds before they can open the prize.

Ads injected in the middle of gameplay often are themselves interactive snippets of other games available in the app store, and lead immediately to the download screen for the advertised game—even when the user does not touch or tap the screen at any point during the ad.



An ad for the game “Township” from Playrix is itself playable and takes the user directly to the download screen for the app.¹⁰¹

¹⁰¹ This ad was encountered in the game “Girl Games: Unicorn Slime” from Shake It.



In the popular young girls' game "Monster High Beauty Shop" by CrazyLabs LTD, timed pop-up advertisements such as this appear after the player dresses up a character or navigates to another page in the app. Even when the timer expires, clicking the exit button directs the user to the app store to install the app.

These techniques are prevalent in apps used by young children. Dr. Jenny Radesky recently led a team of researchers studying design features in apps used by 160 children aged 3 to 5 years who had their own devices and found that 45.9% of the apps observed manipulated navigability to prolong gameplay by including "features like tunneling (providing no options for where to go next), pop-ups, or auto-advancing."¹⁰² Ultimately, the prevalence combined with both the disruption it causes to gameplay and the difficulty in avoiding the navigation manipulation designs emphasizes why they are categorically unfair when used on minors.

¹⁰² Jenny Radesky et al., *supra* note 72.

C. Social manipulation

The third type of design practice that Petitioners urge the FTC to recognize as categorically unfair when used on minors is social manipulation. Petitioners define this design practice category as:

(a) **Social Manipulation.**

(i) Design features that:

(1) Leverage a minor's desire for social relationships to encourage greater time spent and/or activities performed on the website or service.

(ii) Examples of prohibited social manipulation design features include:

(1) **Quantified Popularity of a Minor's Account or Content.**

Displaying a quantified tally of the number of connections or interactions for a minor's account or piece of content, such as followers, views, likes, dislikes, or comments.

(2) **Named Popularity.** Displaying the names, usernames, or other known identifiers of specific other users who have interacted with a particular piece of content, such as by viewing, liking or disliking, or commenting on it.

(3) **Interaction Streaks.** Features that quantify interactions between users, creating pressure for interactions to continue so that the streak value continues to increase.

(4) **Parasocial Relationship Pressure.** The use of an artificial or animated character or a popular influencer on a website or service to pressure or shame a minor into taking a certain action, such as when a game character uses insulting language or pressure to manipulate the minor into continuing to play a game, coming back at another time, making a purchase, or sharing personal information.

(5) **Incentivized Reach to Larger Audience.** Prompting a minor to make their account visible to, or otherwise share content with, users with whom they are not already connected, or defaulting to these settings.

Socially manipulative design features that leverage users' desire for social relationships to encourage increased activity and time spent on a platform are extremely common, including in games and services used heavily by minors. These

design features are particularly prevalent – and minors likely are most often exposed to them – on social media.

Minors are particularly vulnerable to social manipulation techniques. Younger adolescents have specific developmental needs for social connectedness and are particularly attuned to social validation.¹⁰³ This can “lead to greater relinquishing of security in certain arenas to gain social validation and belonging, for example, disclosing publicly to participate in online communities and accrue large amounts of likes, comments, and followers.”¹⁰⁴ Emily Weinstein and Carrie James write:

[T]o tweens and teens, the kind of “rewards” social media promise are even more meaningful. Teens are primed to crave and value social validation, which is part of how they make sense of where they fit into their social worlds. Their biological sensitivity to social feedback makes them more susceptible to the pull of social media, which is at the ready with a promise of 24/7 access to likes and praising comments. Capacities for self-regulation and impulse control are also a work in progress during the teen years, which adds to the challenge of pulling away.¹⁰⁵

Many social manipulation design features induce anxiety in minors that they or their content may not be as popular as that of their peers’. In the words of a Massachusetts high school student who spoke with Common Sense Media, “[I]f you get a lot of likes, then ‘Yay,’ you look relevant, but then if you don’t get a lot of likes and/or views, it can completely crush one’s confidence. Especially knowing that you’re not the only one who’s able to see it.”¹⁰⁶ Not only are minors spotting and seeing posts, but now they are obsessing over the popularity of their and others’ posts. These factors all converge to create a feedback loop, where because minors crave this social reinforcement, they seek it out, and ultimately are unequipped with the tools to protect

¹⁰³ Nicholas D. Santer et al., *Early Adolescents’ Perspectives on Digital Privacy, Algorithmic Rights and Protections for Children* (2021) at 6, 30.

¹⁰⁴ *Id.* at 6 (citing J.C. Yau & S. M. Reich, “It’s Just a Lot of Work”: Adolescents’ Self-Presentation Norms and Practices on Facebook and Instagram, 29 *J. Res. on Adolescence* 196, 196-209 (2019)).

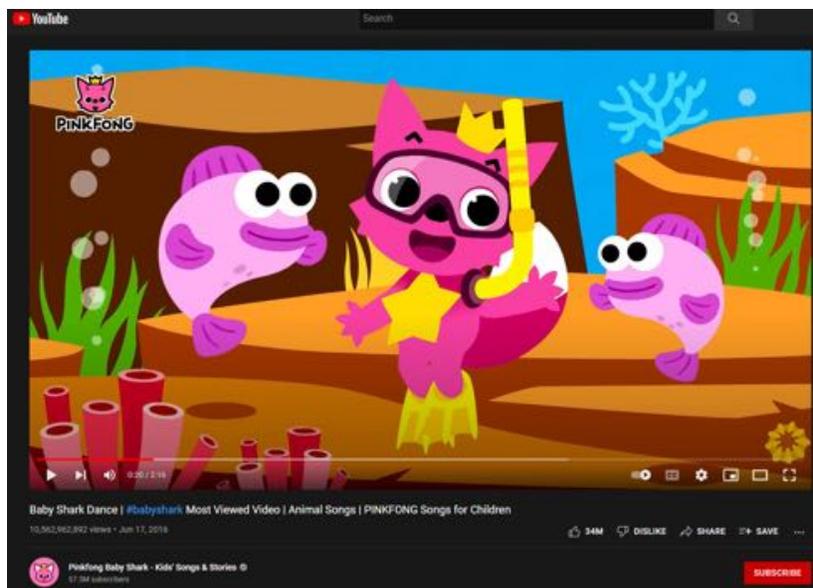
¹⁰⁵ Weinstein & James, *supra* note 36, at 33 (2022) (citing Lucy Foulkes and Sarah-Jayne Blakemore, *Is There Heightened Sensitivity to Social Reward in Adolescence?*, 40 *Current Opinion Neurobiology* 81 (2016)).

¹⁰⁶ Joseff, *supra* note 35.

themselves against the allure of “rewards” that these manipulative social media designs purportedly promise.¹⁰⁷ By nature, these designs breed prevalence.

One way that games and services use social manipulation to increase minor users’ online engagement is through **quantified popularity metrics**. These design features gamify popularity by displaying (publicly, privately, or both) the number of friends or connections a user has, the number of interactions their content has received, and sometimes also the names or usernames of specific other users who have interacted with the user or their content. Metrics that may be displayed include views, likes, dislikes, reactions, and comments received on content. Such tallies act as quantified proof of popularity and exploit minors’ natural tendency to pursue social relevance.

For example, YouTube publicly displays the number of “Likes” a video has received, and until recently also publicly displayed the number of “Dislikes” it received.¹⁰⁸

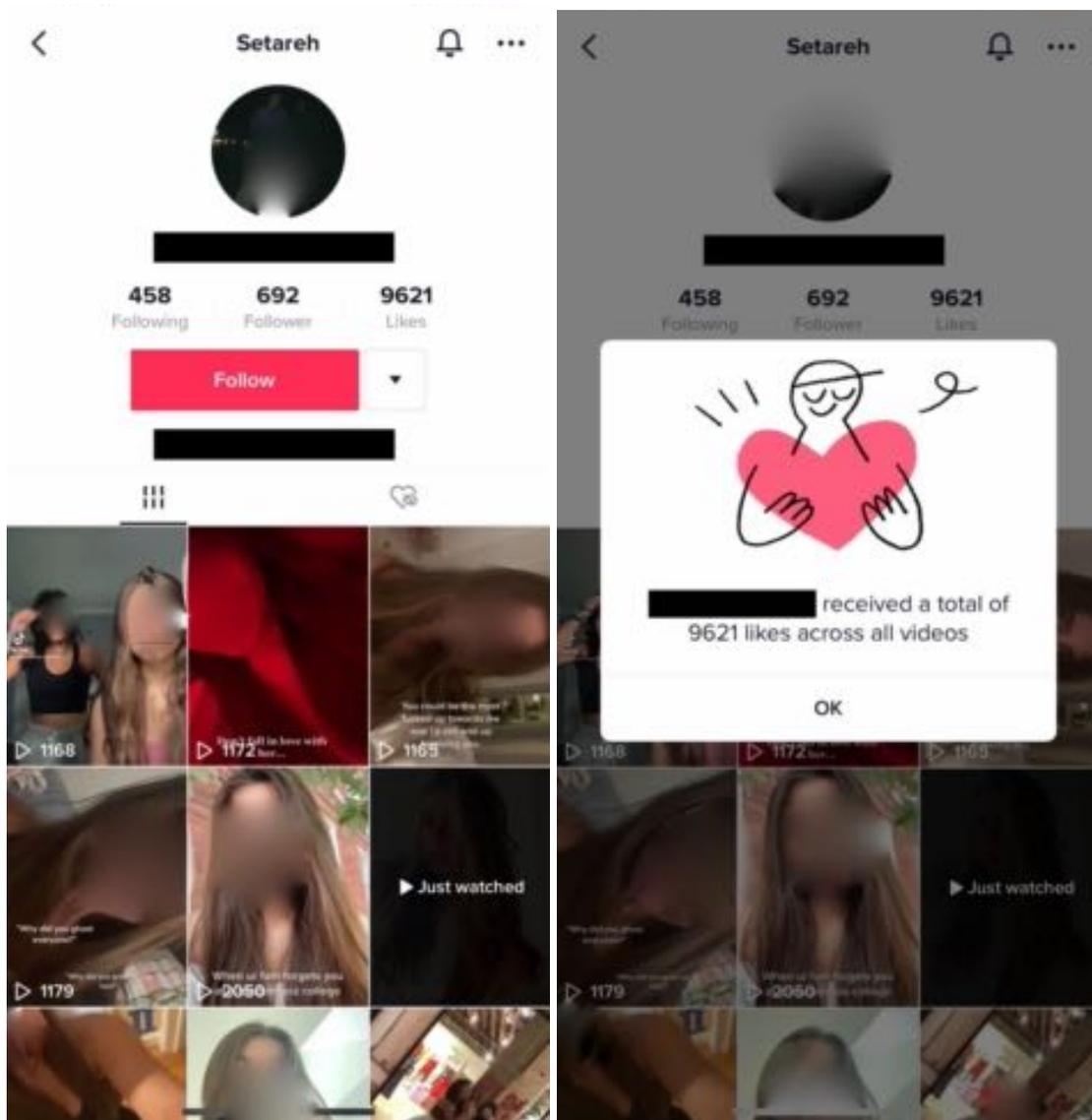


YouTube displays views and likes for each video, as well as the total number of subscribers to the channel.

¹⁰⁷ See discussion *infra* Section III.B.3, “Minors are more susceptible to social manipulation and peer pressure applied by design features that maximize for online engagement.”

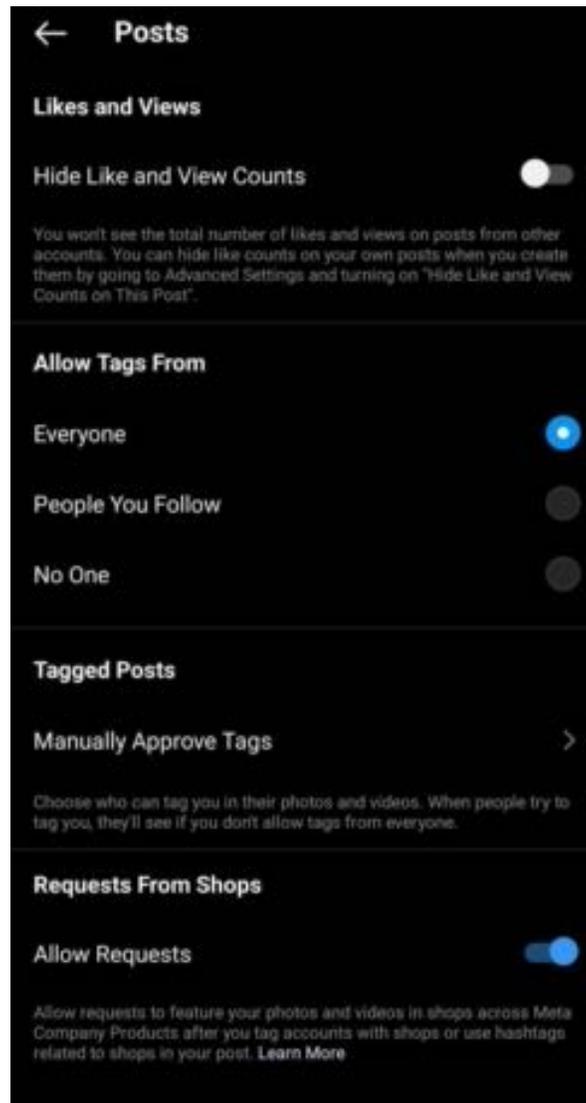
¹⁰⁸ Mitchell Clark, *YouTube Gives Dislikes the Thumbs-Down, Hides Public Counts*, The Verge (November 10, 2021, 5:00 PM), <https://www.theverge.com/2021/11/10/22773299/youtube-dislike-button-hide-public-count-numbers-small-creator-protection> [<https://perma.cc/B2JF-RAZA>].

TikTok displays quantified popularity metrics for each user's account, as well as for each video shared on its platform.



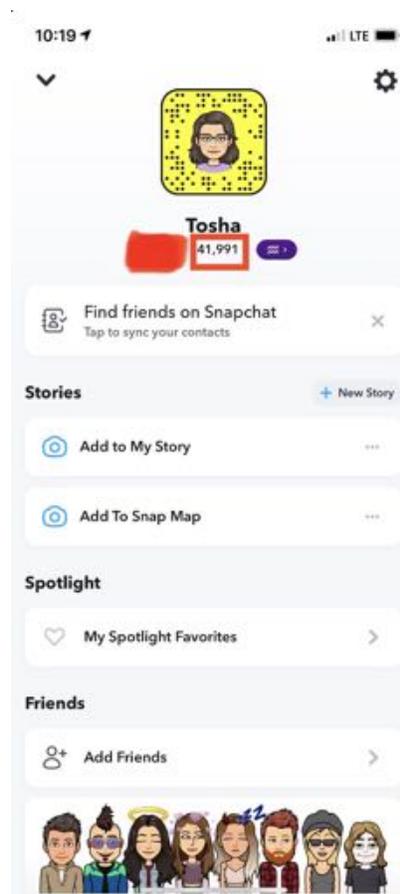
TikTok displays the total number of likes each user has received across all videos.

Instagram defaults to showing the number of likes on each post. The platform permits users to hide like and view counts on individual posts, but it does not allow users to permanently switch this setting for all their posts at once. Instead, if a user wishes to hide these metrics for their posts, the user must make that election on a post-by-post basis.



A user who wishes to avoid displaying like and view metrics for their Instagram posts must make that election on a post-by-post basis.

Similarly, Snapchat has a scoring metric that symbolizes how much the user spends their time or interacts on the app.¹⁰⁹



A user's score is highlighted at the top of a summary of their profile. Users can also easily check friends' scores on their respective profiles.

¹⁰⁹ Briallyn Smith, *How Does Snapchat Score Work? How to Increase Your Score, Make Use Of* (April 2, 2022), <https://www.makeuseof.com/tag/improve-snapchat-score/>.

Games also often use quantified popularity for in-game features that players can share publicly with other players of the game.

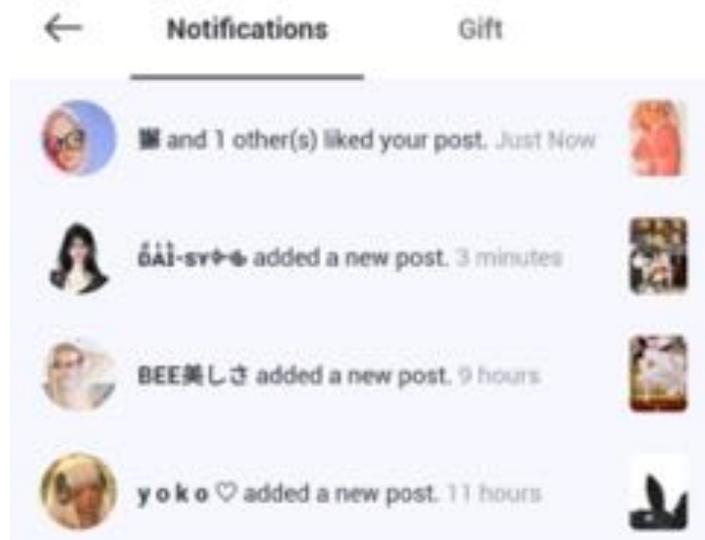


In "Hello Kitty World 2: Sanrio Kaw" from Access Bright, Japan Inc., when a user visits another user's theme park, the top left corner displays the number of likes their theme park received. This user here is shown to have 3 likes.

Some games and services also utilize **named popularity** features by displaying the names of specific users who have interacted with a particular piece of content by viewing, liking, disliking, sharing or commenting on it. These features encourage users to engage with content in pursuit of achieving or reinforcing social relevance with particular other people, such as close friends or people they perceive as cool or influential. These visible names may not even be people the user follows.

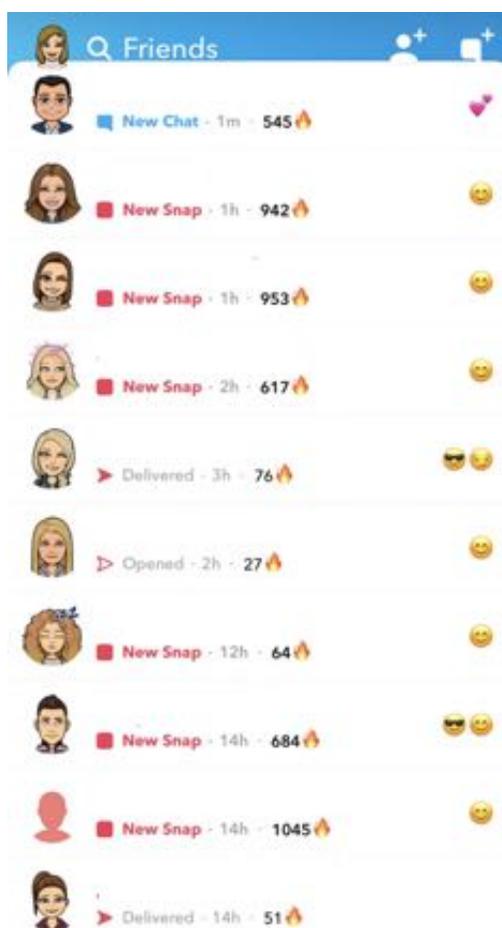


Instagram displays the usernames and profile pictures of specific users who have liked a piece of content. The first username displayed after the “liked by” on a post, in this case @aimi.allover, is not necessarily someone the user viewing the photo follows.



“Zepeto” from Naver Z Corporation displays the usernames and profile pictures of specific users who have interacted with a piece of content.

Games and services also sometimes maximize minors' online engagement through the use of **interaction streaks**. Streaks are design features that pressure users to continue an ongoing series of interactions with the service or another user. For example, Snapchat keeps track of how many consecutive days two people have been Snapchatting, displaying the number of consecutive days – the “Snapstreak” value – next to each friend's name.¹¹⁰



A number with a flame appears next to each friend's name, indicating the length (in days) of the user's Snapstreak with the friend.

For teens in particular, Snapstreaks are a vital part of using the app, and – for many – of their social lives as a whole.

¹¹⁰ Longest Snapchat Streak, TechMirror (April 19, 2020), <https://thetechmirror.com/longest-snapchat-streak/> [https://perma.cc/46BU-4VBM].

Fostering compulsive daily use of its platforms and measuring the strength of a friendship through Snapchat participation clearly benefits Snap, but Snapstreaks undermine young people's wellbeing. In addition to increasing the time that minors spend online, streak features often generate harmful social pressure and anxiety.¹¹¹ For Snapchat users, Snapstreaks are considered a measure of the strength of users' relationships – the longer a streak, the more valuable the relationship.¹¹² Teenagers regard Snapstreaks as proof of friendship, with those having the most and longest streaks considered the most popular.¹¹³ Many teenagers invest significant effort and time every day to set up and maintain their streaks, sometimes even going so far as arranging to have others log in on their behalf to continue their streaks when they are themselves unable to.¹¹⁴

Quotes from teenagers interviewed by journalists about Snapstreaks illustrate the intense pressure and anxiety this feature generates to remain engaged on the service:

- "I hate streaks because it forces you to be on your phone every day. . . . Say you have a 100-day streak. There's a lot of obligation to continue. So if you lose your streak, it's like the world's over." – Sam, high school freshman¹¹⁵
- "A big part of it is social acceptance. . . . Having more streaks makes you feel more popular. . . . It shows [people's] social status to see how many streaks they have." – Will, 15¹¹⁶

¹¹¹ Lori Janjigian, *What I Learned After Taking Over My 13-Year-Old Sister's Snapchat for Two Weeks*, Business Insider (Aug. 4, 2016, 11:53 AM), <https://www.businessinsider.com/how-teens-are-using-snapchat-in-2016>.

¹¹² *Id.*; Taylor Lorenz, *Teens Explain the World of Snapchat's Addictive Streaks, Where Friendships Live or Die*, Insider (Apr. 14, 2017, 1:58 PM), <https://www.insider.com/teens-explain-snapchat-streaks-why-theyre-so-addictive-and-important-to-friendships-2017-4> (for example, Catie Clark, age 13, explains, "On Snapchat, streaks develop a level of friendship between people. The longer your snap streak is, the better friends you are."); Jacob Shamsian, *Teens Are Obsessed with this One Snapchat Score that Can Make or Break Friendships*, Insider, (Dec. 14, 2016, 4:51 PM), <https://www.insider.com/teens-are-obsessed-with-snap-streaks-on-snapchat-2016-12> (Eve, a freshman at The New School, says, "I've heard people say things like 'oh yeah, I love her, we have a 200 day Snapchat streak.'").

¹¹³ Lorenz, *supra* note 112.

¹¹⁴ Janjigian, *supra* note 111; Lorenz, *supra* note 112.

¹¹⁵ Shamsian, *supra* note 112.

¹¹⁶ Lorenz, *supra* note 112.

- “Once you start a streak with someone, you’ve got to be committed to just send a quick message every day. If you stop it, it shows that you don’t really care about that person.” – Rafael, 14¹¹⁷
- “One of my friends actually called me while I was sleeping to make sure our streak would still be going. . . . He called me four times and woke me up to keep the streak alive.” – Sam D., 15¹¹⁸

Games and services also use design features that leverage the minor’s **parasocial relationships** with fictional characters or media personalities to increase online engagement.¹¹⁹ A parasocial relationship (PSR) is a one-sided relationship between a human viewer and a media character.¹²⁰ In other words, PSR refers to emotions, including a feeling of friendship, that a viewer develops toward a media character.¹²¹ Children and teenagers form parasocial relationships with fictional characters, influencers, and other media figures.¹²² These bonds are influential: Evidence shows that young children are more likely to follow the instructions of media characters they have formed a relationship with, compared to unknown but similarly entertaining characters.¹²³

Games and services manipulate users through parasocial relationships by, for example, shaming them into taking certain actions. These design features are widespread even in services used by really young children. A recent study of apps used by 3- to 5-year-olds found that 24.8% of the apps observed “used parasocial characters to prolong gameplay, either by pressuring the user to keep playing or by expressing disapproval if they stopped.”¹²⁴

¹¹⁷ *Id.*

¹¹⁸ *Id.*

¹¹⁹ Parasocial relationships are one-sided relationships that individuals develop with fictional characters or media personalities. See Hope Gillette, *What Are Parasocial Relationships*, PsychCentral (Feb. 15, 2022), <https://psychcentral.com/health/parasocial-relationships>.

¹²⁰ Amanda N. Tolbert & Kristin L. Drogos, *Tweens’ Wishful Identification and Parasocial Relationships with YouTubers*, 10 *Frontiers Psychol.* 1, 4 (2019), <https://doi.org/10.3389/fpsyg.2019.02781>.

¹²¹ *Id.*

¹²² *Id.*

¹²³ Alexis R. Lauricella et al., *Toddlers’ Learning from Socially Meaningful Video Characters*, 14 *Media Psychol.* 216, 226-227 (2011), <https://doi.org/10.1080/15213269.2011.573465>.

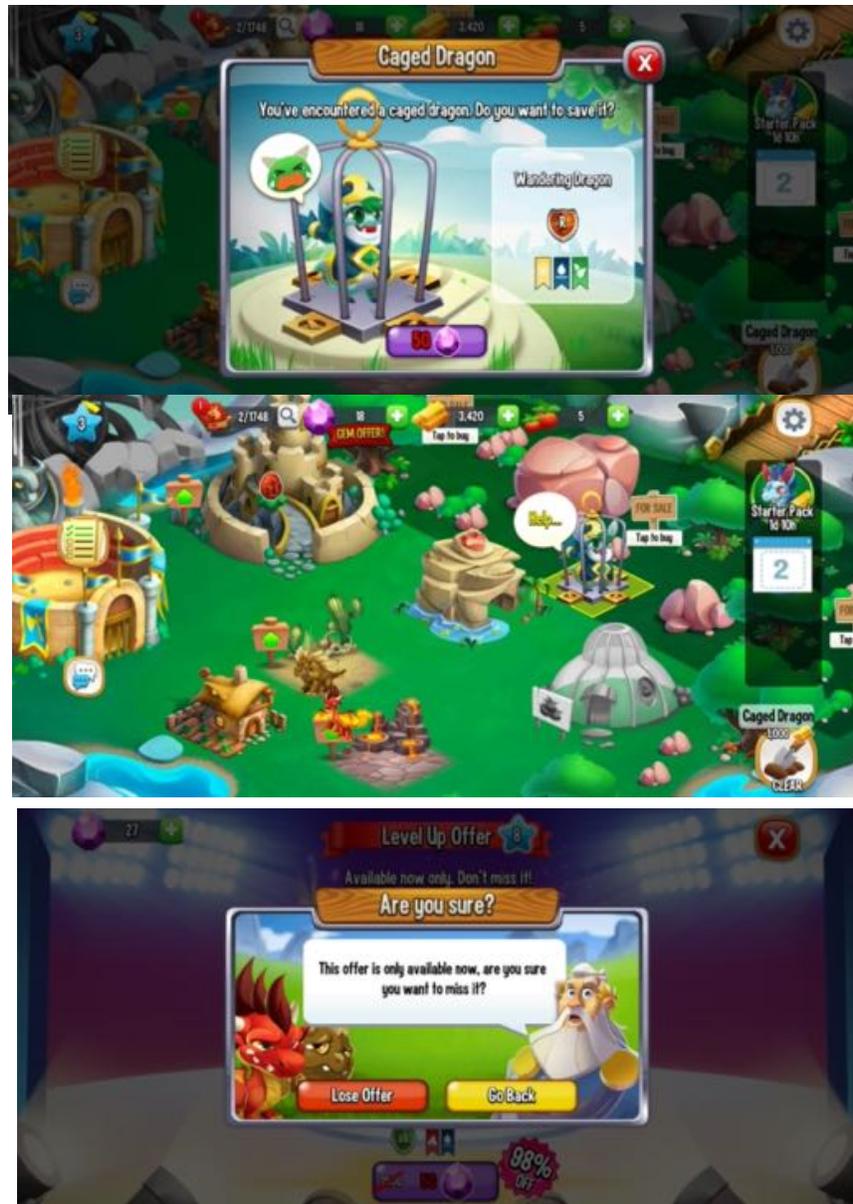
¹²⁴ Radesky et al., *supra* note 72, at 6.



A character in a Roblox game accuses the player of lying to get the player to join a group, which gives the player access to other parts of the game like battling other groups. The player may have to send a personal message to join the group.

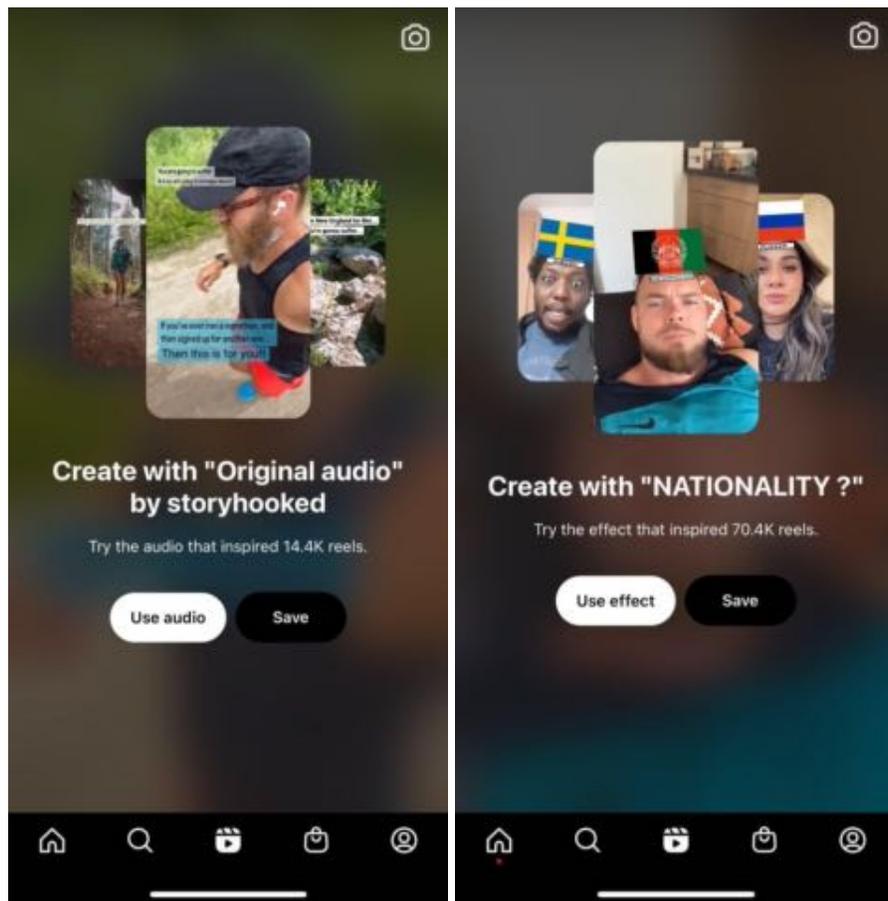


In an ad for the well-known game “Candy Crush Saga” by King, a character will drown if players are unsuccessful or choose to ignore the advertisement. Failing to save her causes a pop-up to appear with characters looking sad and a button for users to download and play the game.



In “DragonCity” from Social Point, caged baby dragons appear with chat bubbles stating “Help...” When clicking the dragon, the user is asked if they want to save the crying dragon for a price of 50 diamonds – which would likely require an in-game purchase or extensive gameplay because diamonds are rarely awarded throughout the game (top and middle). When the user refuses to purchase a limited time in-game purchase offer, a pop-up asks the user if they are sure, featuring sad baby dragons and a shocked God character (bottom).

Games and services also use design features that **incentivize reach to a larger audience**. These platforms encourage and even pressure minors to share information about themselves that they otherwise would not share, or to share their content with larger audiences than they originally intended. For example, Instagram frequently prompts passive users to create and share content, rather than merely viewing content created by others. When we created an Instagram account for a fictitious 14-year-old, we found that when we scrolled through Reels, we received periodic prompts to create our own content using filters and audio that are popular among other users.¹²⁵

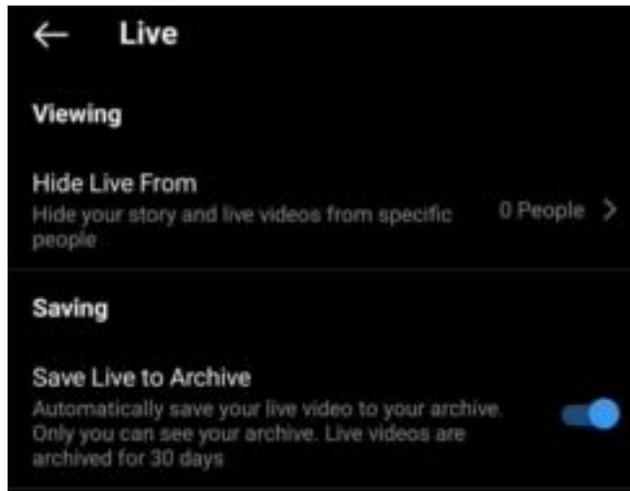


As our fictitious 14-year-old Instagram user scrolled through Reels on the app, she was prompted to create content using effects and audio that are popular among other users.¹²⁶

¹²⁵ We received these prompts on an Instagram account we created using the self-provided birthdate of August 17, 2008.

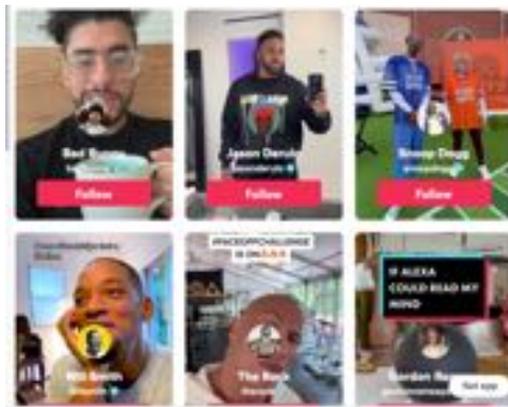
¹²⁶ *Id.*

In many instances, content sharing options default to sharing content publicly or to wider audiences not otherwise directly known to the minor. For example, “Live” videos on Instagram are made public by default. Users can only elect to hide Live videos from users they specify individually.



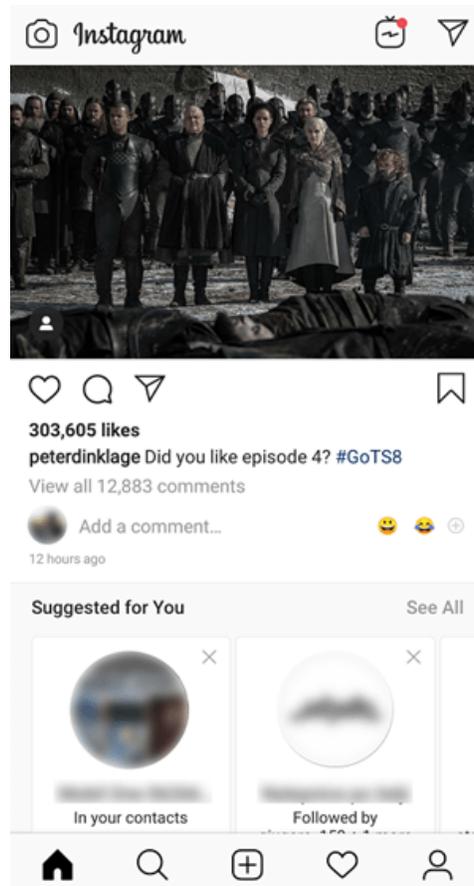
Instagram Live videos are available to everyone unless the user identifies specific individuals they wish to exclude. To block non-followers, the user would have to make their account private.

Similarly, apps and services also often encourage users to connect with additional accounts with which they have no actual connection. For example, TikTok presents users with suggested accounts to follow.



TikTok presents users with suggested accounts to follow.

Similarly, when Instagram users view content, the service suggests other accounts for the user to follow, including accounts followed by other people the user already follows.

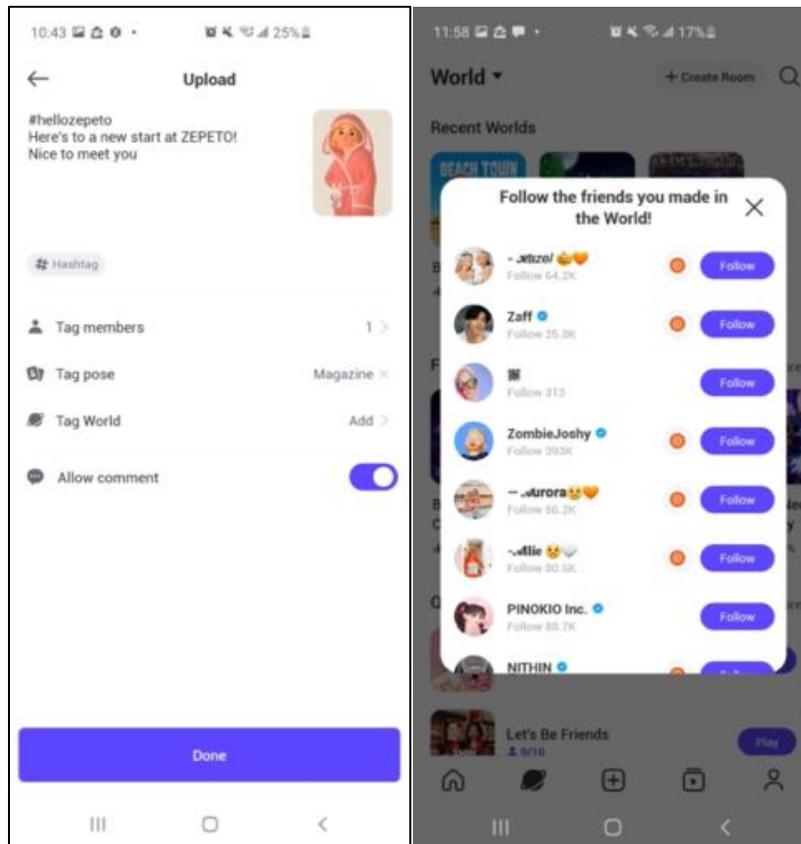


Instagram displays “Suggested for You” profiles encouraging the user to follow other accounts.

Finally, games and services also frequently incentivize, encourage, and remind minors to invite their friends to join the platform.



In "Candy Crush Saga" from King, the game encourages users to invite friends in order to have more lives in the game.



In "Zepeto" from Naver Z Corporation the user is directed to take a picture of their avatar in the tutorial and upload it to their feed where "allow comments" is turned on by default (left).

This incentivization serves to maintain the minor’s connection to the app or service. The more friends a user has on a given platform, the more incentive the user has to spend time on that app or service, and the more activities they will engage in while there. Further, when a user utilizes an “invite friends” function, the platform often accesses the user’s private contacts. Ultimately then, the minor, because they are incentivized to reach a larger audience, shares more data and information than they otherwise would have.

III. Design practices that maximize minors’ online engagement are unfair under the FTC Act.

Petitioners urge the FTC to use its authority to promulgate regulations prohibiting use of the above-enumerated categories of design practices on minors because these practices are not only prevalent, but also categorically unfair when used on minors. A practice is unfair if it causes consumer injury that is substantial, that is not outweighed by any countervailing benefits to consumers or competition, and that cannot reasonably be avoided by consumers themselves.¹²⁷

The design features discussed in this Petition are employed by apps and services in a variety of ways, substantially injuring minor users. As a result of optimization for engagement, minors currently suffer serious psychological and physical harms.

The serious harms caused by these practices, as described above, plainly outweigh any modest countervailing benefits they may have. The use of design features that maximize online engagement of minors benefits apps and services by increasing their revenue. But the cost to minors’ wellbeing is extraordinarily high.

Neither minors nor their families can reasonably avoid the harms caused by the use of these design practices. Minors are not psychologically equipped to avoid the harms caused by these design practices. Parents and guardians cannot reasonably protect their kids from these harms, either.

A. These design practices do not offer countervailing benefits to minors or competition

When the FTC evaluates harmful practices under its authority to prohibit unfair practices, the FTC considers any benefits to consumers or competition as a result of the

¹²⁷ Policy Statement on Unfairness, *supra* note 6.

practice, as well as costs of the proposed remedy, and weighs them against the injury to consumers.¹²⁸ The harms flowing from manipulative design features that maximize minors’ engagement with online services far outweigh any benefits.

The main benefit of these design tactics is that they help apps and services generate more revenue, including by increasing in-app transactions, advertising revenue, and monetization of user data.¹²⁹ The longer users stay on a platform and the more they engage, the more data platforms and services, third party data collectors, and advertisers can collect about them. This increases the ability to more precisely and effectively target users with personalized ads and increase ad revenue. As an example, the more a user engages on a website, the more likely that site is to appear higher in search results for other users; Google uses “dwell time metric” as a way to measure the relevancy and quality of a website. This in turn increases the value of that online service.¹³⁰ Other engagement-optimizing features also endow financial benefit to platforms and services by facilitating in-app purchases. All of these features feed into benefits for the business model, not minors.

These practices do not benefit competition. On the contrary, the use of these unfair and deceptive design practices by some actors creates a “race to the bottom.” Any company that does not deploy these unfair and deceptive practices on its users risks losing out on the financial benefits enjoyed by competitors who do manipulate their users.¹³¹ Because these practices are designed to influence minors and their families without their notice, the market cannot correct this problem on its own—digital platforms hold far more information about the design and data collection practices associated with their products and services than any individual consumer.

¹²⁸ *Id.*

¹²⁹ Some online businesses claim that by increasing the revenue generated by an app or service, designing to maximize engagement reduces out-of-pocket costs to users and allows many more people to access a broader range of content online. *See, e.g.*, ESA comments on “Bringing Dark Patterns to Light: An FTC Workshop” at 4, https://downloads.regulations.gov/FTC-2021-0019-0116/attachment_1.pdf.

¹³⁰ *See* Nick Chasinov, *User Engagement Is the New SEO: How to Boost Search Rank by Engaging Users*, Hubspot (Jan. 4, 2021), <https://blog.hubspot.com/marketing/user-engagement-seo>.

¹³¹ Daniel Susser et al., *Online Manipulation: Hidden Influences in a Digital World*, 4 *Georgetown Law Technology Review* 1, 35 (2019); *see also* Ryan Calo, *Digital Market Manipulation*, 82 *Geo. Wash. L. Rev.* 995, 10001 (2014) (citing Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: Some Evidence of Market Manipulation*, 112 *Harv. L. Rev.* 1420, 1564–65 (1999)).

A potential benefit for *minors* is that some of these design features may cause them to receive more relevant content or receive it more efficiently. Yet even if that is true, relevance and efficiency in content and advertising are being pushed on minors. Instead of minor users “pulling” the information – asking for and receiving the information they desire – they are supplied with content that is being “pushed” to them. These “pushes” expose minors to harmful content. For example, with autoplay, the next video is automatically started (pushed) onto the user. Autoplay and suggested video features have led, for example, to minors viewing videos encouraging suicide.¹³² Ultimately, the substantial harms to minors from these design practices – discussed in detail above¹³³ – far outweigh any convenience benefit to minors or any monetary benefits to operators of apps, games, and other online services.

B. Minors lack the developmental maturity necessary to protect themselves from design features that maximize engagement.

The FTC’s unfairness analysis also considers whether the injury is one that consumers themselves can reasonably avoid, because the FTC’s unfairness authority is to be used “not to second-guess the wisdom of particular consumer decisions, but rather to halt some form of seller behavior that unreasonably creates or takes advantage of an obstacle to the free exercise of consumer decision making.”¹³⁴ This part of the unfairness analysis is easily satisfied with respect to the use on minors of design features that maximize online engagement.

Minors cannot reasonably avoid the harms caused by design features that maximize online engagement because these features are designed expressly to exploit developmental vulnerabilities of immature brains. Design features that maximize engagement stem from the field of persuasive design (also called persuasive technology) – a developing field that focuses on influencing human behavior and actions through design techniques and psychology.¹³⁵ Tech companies regularly employ psychologists and behavioral science experts to assist software engineers in

¹³² Heilweil, *supra* note 2.

¹³³ See discussion *supra* Section I, “Design practices that maximize users’ time and activities online cause substantial injury to minors.”

¹³⁴ Policy Statement on Unfairness, *supra* note 6.

¹³⁵ *Our Letter to the APA*, Screen Time Action Network (Aug. 8, 2018), <https://screentimenetwork.org/apa?eType=EmailBlastContent&eId=5026ccf8-74e2-4f10-bc0e-d83dc030c894>.

designing code that maximizes user engagement online.¹³⁶ After all, the ecosystem of internet-based companies depends on user engagement – it drives the entire business model; the more users engage online, the more money the online operators can make.¹³⁷ Tristan Harris, Google’s former design ethicist, stated that “[t]he job of these companies is to hook people, and they do that by hijacking our psychological vulnerabilities.”¹³⁸ As one software engineer stated, “[e]ngagement *has* to be in the background of everything we do.”¹³⁹

Design features such as those discussed in this Petition are strategic choices selected and refined for their efficacy at altering user behavior. As a leading engineer of the infinite scroll feature said, “[b]ehind every screen on your phone, there are . . . literally a thousand engineers that have worked on [the design features] to try to make it maximally addicting.”¹⁴⁰ Often, the efficacy of a design feature is evaluated prior to implementation in a process known as “A/B testing,” in which different versions of a design interface are tested in operation on real users.¹⁴¹ For example, in one famous example, Google A/B tested forty-one different shades of blue in its toolbar to see which version – with which particular shade of blue – drew the most clicks from real-world users.¹⁴² Designers also can track how individual users behave and tweak the

¹³⁶ Hartford & Stein, *supra* note 85 (“[T]he goal of many software developers has been to design products that generate habitual engagement and maximize use, drawing on techniques from applied psychology, neuroscience and behavioral economics.”); Chavie Lieber, *Tech Companies Use “Persuasive Design” to Get Us Hooked: Psychologists Says It’s Unethical*, Vox (Aug. 8, 2018, 2:30 PM), <https://www.vox.com/2018/8/8/17664580/persuasive-technology-psychology>.

¹³⁷ See Hartford & Stein, *supra* note 85.

¹³⁸ Victoria L. Dunckley, *How the Tech Industry Uses Psychology to Hook Children*, Psychol. Today (Oct. 24, 2018), <https://www.psychologytoday.com/us/blog/mental-wealth/201810/how-the-tech-industry-uses-psychology-hook-children>.

¹³⁹ Ari E. Waldman, *Industry Unbound: The Inside Story of Privacy 2.0* (Cambridge University Press, 2021) (emphasis added).

¹⁴⁰ Hillary Andersson, *Social Media Apps Are ‘Deliberately’ Addictive to Users*, BBC News (July 4, 2018), <https://www.bbc.com/news/technology-44640959>.

¹⁴¹ A/B testing, as known as split testing, refers to the practice of comparing two versions of something to figure out which performs better. This practice is commonly used on websites and apps to help maximize design features for engagement. See Amy Gallo, *A Refresher on A/B Testing*, Harv. Bus. Rev. (June 28, 2017), <https://hbr.org/2017/06/a-refresher-on-ab-testing>.

¹⁴² Rags Srinivasan, *Testing 40 shades of blue – AB testing*, Iterative Path (Oct. 29, 2012), <https://iterativepath.wordpress.com/2012/10/29/testing-40-shades-of-blue-ab-testing/>.

user experience to get each user to engage more.¹⁴³ This kind of A/B testing can be run at scale and endlessly, meaning the experience is constantly being changed in order to maintain the business's desired action (optimizing engagement).¹⁴⁴

Petitioners urge the FTC to take into account five specific developmental reasons that minors are incapable of successfully defending against these practices. First, minors lack mature executive function skills. Second, teens have a heightened tendency to engage in reward-seeking behavior relative to adults. Third, minors are more susceptible to peer pressure than their adult counterparts. Fourth, young children in particular lack the ability to understand persuasive intent or bias behind design features deployed for the purpose of influencing their behavior. And finally, young minors are more trusting than adults, rendering them more vulnerable to social manipulation.

1. Minors lack mature executive function skills necessary to reasonably avoid design features that maximize engagement

The first and perhaps most important developmental reason that minors cannot reasonably avoid the harms caused by design features that maximize for engagement is because they lack mature executive functioning.¹⁴⁵ Executive functioning is a set of related cognitive abilities critical to directing attention and behavior,¹⁴⁶ especially in an online environment. Because of its role in filtering distractions, prioritizing tasks, and setting goals, the area of the brain involved in executive functioning is commonly referred to as the brain's air traffic controller.¹⁴⁷ Cognitive abilities associated with

¹⁴³ 5Rights Foundation, *Pathways: How Digital Design Puts Children at Risk* at 29 (July 2021), <https://5rightsfoundation.com/uploads/Pathways-how-digital-design-puts-children-at-risk.pdf>.

¹⁴⁴ *Id.*

¹⁴⁵ The development of executive functioning skills is tied to the maturation of the prefrontal cortex of the brain. This is the last area of the brain to develop. See Louis L. Moses & Dare A. Baldwin, *What Can the Study of Cognitive Development Reveal About Children's Ability to Appreciate and Cope with Advertising?*, 24 J. Pub. Pol'y & Mktg. 186, 194 (2005).

¹⁴⁶ Timothy D. Nelson et al., *Executive Control Throughout Elementary School: Factor Structure and Associations with Early Childhood Executive Control*, 58 *Developmental Psych.* 730, 730 (2022), <https://pubmed.ncbi.nlm.nih.gov/35343719/>; Philip D. Zelazo et al., *Executive Function: Implication for Education*, Nat'l Ctr. for Educ. and Res. at 1 (2017), <https://ies.ed.gov/ncer/pubs/20172000/pdf/20172000.pdf>.

¹⁴⁷ Center on the Developing Child, *Executive Function & Self-Regulation*, Harvard University, <https://developingchild.harvard.edu/science/key-concepts/executive-function/>; Leanda Barrington-Leach, *How Children Think and How Persuasive Design Tech Can and Does Exploit Their*

executive functioning include impulse control, decision-making, attentional flexibility, planning, self-regulation, and resistance to interference.¹⁴⁸ These are not fully developed until adulthood.¹⁴⁹

Design features that maximize online engagement target and manipulate areas of the brain involved in executive functioning. For example, infinite scroll and autoplay were designed to exploit users' inability to control their impulses.¹⁵⁰ These design features steer users endlessly through content without clicking. Even adults have a difficult time exiting these endless loops, and doing so requires a significant amount of self-control.¹⁵¹

When games and apps employ these design practices, minors lack the impulse control and self-regulation necessary to avoid harms. This is common sense for anyone who knows minors, and is implied in many policy discussions regarding optimization for engagement. For example, in 2021 the Subcommittee on Economic and Consumer Policy of the House of Representatives Oversight Committee raised concerns around autoplay in a letter to the YouTube CEO, because this design feature "places the onus on the child to stop their viewing activity, rather than providing a natural breaking point."¹⁵² Since then, YouTube Kids has turned autoplay off by default,¹⁵³ signifying the importance of reining in the use of autoplay and similar design features against young users. But autoplay is still the default on YouTube's regular service, which most teenagers and many minors under the age of 13 use regularly.¹⁵⁴

Immature executive functioning also has an enormous impact on minors' ability to process, cope with, and defend against advertising.¹⁵⁵ Due to immature executive

Vulnerabilities, LinkedIn (May 18, 2021), <https://www.linkedin.com/pulse/how-children-think-persuasive-design-tech-can-does-barrington-leach/>.

¹⁴⁸ Moses & Baldwin, *supra* note 145.

¹⁴⁹ Heather J. Ferguson et al., *The Developmental Trajectories of Executive Function from Adolescence to Old Age*, *Sci. Rep.* (2021), <https://www.nature.com/articles/s41598-020-80866-1.pdf>.

¹⁵⁰ Andersson, *supra* note 140.

¹⁵¹ Hartford & Stein, *supra* note 85.

¹⁵² Chairman Raja Krishnamoorthi, Subcommittee on Economic and Consumer Policy, Letter to YouTube CEO Susan Wojcicki (April 6, 2021), <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/2021-04-06.RK%20to%20Wojcicki-YouTube%20re%20YouTube%20Kids%20Content.pdf>.

¹⁵³ *Overview of YouTube Kids Setting for Your Kid's Google*, Google, <https://support.google.com/youtubekids/answer/7348846>.

¹⁵⁴ Vogels et al., *supra* note 38.

¹⁵⁵ See Moses & Baldwin, *supra* note 145, at 195.

functioning, minors have a diminished ability to resist advertising, diminished ability to control their attention when they are distracted by advertising, and diminished ability to critically judge advertising relative to adults.¹⁵⁶ Similar vulnerabilities apply when minors engage with design features that maximize engagement. It is not reasonable to rely on companies to protect minors because the business and the engagement-maximizing features that serve it are predicated on manipulating minors.

2. Teens' heightened reward-seeking behavior makes them more vulnerable to design features that maximize for engagement

Another developmental reason that teens in particular cannot avoid harms caused by design features that maximize engagement is because adolescence is a period of heightened sensation- and reward-seeking behaviors.¹⁵⁷ Starting in early adolescence, there is a significant increase in brain activity related to the neurotransmitter dopamine.¹⁵⁸ This contributes to teens' tendency to seek out experiences motivated by rewarded stimuli,¹⁵⁹ as well as their experience of heightened arousal in response to rewards.¹⁶⁰ Teens' sensation- and reward-seeking behaviors encourage teens to strike out on their own at an age when they are growing more independent.¹⁶¹

¹⁵⁶ *Id.*

¹⁵⁷ Adriana Galvan, *Adolescent Development of the Reward System*, 4 *Frontiers Hum. Neuroscience* 1, 1 (2010).

¹⁵⁸ Eveline A. Crone, *Executive Functions in Adolescence: Inferences from Brain and Behavior*, 12 *Developmental Science* 825, 829 (2009) ("Given the important role of dopamine in the brain's reward circuitry, this redistribution of dopamine receptors may increase reward-seeking behavior in puberty and therefore affect executive functions.").

¹⁵⁹ Ashley C. Parr et al., *Dopamine-Related Striatal Neurophysiology Is Associated with Specialization of Frontostriatal Reward Circuitry Through Adolescence*, 201 *Progress in Neurobiology* 1, 1 (2021), <https://www.biorxiv.org/content/10.1101/2020.06.24.169847v1.full>; Dustin Albert & Laurence Steinberg, *Judgment and Decision Making in Adolescence*, 21 *J. Res. on Adolescence* 211, 217-219 (2011) (demonstrating adolescent peaks in sensitivity to reward) ("In sum, to the degree that adolescents are primed to seek out and respond to rewards, and at the same time possess immature self-regulatory skills, the influence of socioemotional stimuli is likely to loom large for their decision making").

¹⁶⁰ Anna C.K. van Duijvenvoorde et al., *What Motivates Adolescents? Neural Responses to Rewards and Their Influences on Adolescents' Risk Taking, Learning and Cognitive Control*, 70 *Neuroscience Biobehavioral Rev.* 135, 136 (2016), https://brainanddevelopment.nl/wp-content/uploads/2019/08/VanDuijvenvoorde_et_al_2016_Brain_Rewards_Adolescence.pdf.

¹⁶¹ Parr et al., *supra* note 159 (stating that heightened sensation seeking and reward-seeking behaviors "are thought to be adaptive for . . . specializing the neurobiological pathways required to transition to independence in adulthood.").

Design features that maximize engagement – such as variable rewards, endless scroll, likes, and similar features – are intentionally and strategically designed to stimulate the brain’s reward center.¹⁶² Indeed, the psychological mechanism behind many persuasive technologies is the triggering of dopamine – which, as discussed above, is more active in teenagers.¹⁶³ For example, variable rewards, when given, generate higher levels of dopamine than predictable rewards.¹⁶⁴

Further, adolescents are particularly susceptible to immediate rewards,¹⁶⁵ such as those granted instantly in a virtual environment. According to the American Psychological Association, the American Psychiatric Association, and the National Association of Social Workers, teens are “emotionally primed for spur-of-the-moment, reward- and sensation-seeking behavior without offsetting adult sensitivities to corresponding risks and longer-term consequences.”¹⁶⁶ Neurobiological research

¹⁶² Richard Freed, *The Tech Industry’s War on Kids: How Psychology is Being used as a Weapon Against Children*, Medium (Mar. 12, 2018), <https://medium.com/@richardnfreed/the-tech-industrys-psychological-war-on-kids-c452870464ce> (“Social networks and video games use the trusted brain-manipulation technique of variable reward (think slot machine). Users never know when they will get the next “like” or game reward, and it’s delivered at the perfect time to foster maximal stimulation and keep them on the site); Duncley, *supra* note 138; Erin Walsh & David Walsh, *Persuasive Design and Growing Brains: Why It Can Be So Hard to Unplug*, Psychol. Today (Oct. 24, 2019), <https://www.psychologytoday.com/us/blog/smart-parenting-smarter-kids/201910/persuasive-design-and-growing-brains> (“App designers know that if we receive rewards every time we do something that it has a diminishing impact over time. Instead, most apps are designed to deliver rewards using variable reinforcement.”),

¹⁶³ Freed, *supra* note 162. See discussion *supra* Section III.B.2, “Teens’ heightened reward-seeking behavior makes them more vulnerable to design features that maximize for engagement.”

¹⁶⁴ Hartford & Stein, *supra* note 85, at 3 (“At the level of our neural reward system, an uncertain reward generates a more significant dopamine response than those generated by a reliable reward. On prominent internet platforms, sophisticated machine learning technologies now endeavor to randomize rewards for each user.”); Edwards, *You’re Addicted to Your Smartphone. This Company Thinks It Can Change That*, Time (Apr. 13, 2018, 6:32 AM), <https://time.com/5237434/youre-addicted-to-your-smartphone-this-company-thinks-it-can-change-that/> (“The human brain produces more dopamine when it anticipates a reward but doesn’t know when it will arrive).

¹⁶⁵ See Sihan Liu et al., *Core Symptoms and Symptom Relationship of Problematic Internet Use Across Early, Middle, and Late Adolescence: A Network Analysis*, 128 *Computers Hum. Behav.* 2 (2022) (explaining that early adolescents may become enthusiastic adopters of the Internet due to their sensation-seeking tendencies); Laurence Steinberg et al., *Age Differences in Future Orientation and Delay Discounting*, 80 *Child Dev.* 28, 39 (2009).

¹⁶⁶ Brief for the American Psychological Association, the American Psychiatric Association, and the National Association of Social Workers as Amici Curiae in Support of Petitioners, *Miller v. Alabama*, 132 S. Ct. 2455, 2464–65 (2012) (Nos. 10-9646, 10-9647).

indicates that adolescents' decision-making is biased toward their reward systems, rather than their cognitive control systems, as in adults.¹⁶⁷ This is, in part, because adolescents' cognitive control system is not mature enough to restrain impulses.¹⁶⁸

Companies are well aware that the design features at issue in this Petition circumvent young people's psychological defenses. For example, in 2020 Meta's internal research reported that, "Thirty-two percent of teen girls said that when they felt bad about their bodies, Instagram made them feel worse." Further, "Teens regularly reported wanting to spend less time on Instagram, the presentations note, but lacked the self control to do so."¹⁶⁹ What this research shows is an awareness that the design of their app not only hurts teens, it supersedes the teens own desire to stop.

3. Minors are more susceptible to social manipulation and peer pressure applied by design features that maximize for online engagement

Another developmental reason that minors are unable to avoid harms caused by design features that maximize engagement is because they are very sensitive to social and peer pressure. Starting around age six, minors develop a need to fit in with their peers,¹⁷⁰ and starting around age ten they feel the need to be noticed and admired by others.¹⁷¹ Being accepted evokes activation in the brain's reward center.¹⁷² At the same time, the immature prefrontal cortex of minors' brains render them developmentally

¹⁶⁷ Parr, *supra* note 159.

¹⁶⁸ Lauren E. Sherman et al., *Peer Influence Via Instagram: Effects on Brain and Behavior in Adolescence and Young Adulthood*, 89 *Child Development* 37, 38 (2017), <https://onlinelibrary.wiley.com/doi/epdf/10.1111/cdev.12838>.

¹⁶⁹ Georgia Wells et al., *Facebook Knows Instagram Is Toxic for Teen Girls, Company Documents Show*, W.S.J. (Sept. 14, 2021), <https://www.wsj.com/articles/facebook-knows-instagram-is-toxic-for-teen-girls-company-documents-show-11631620739>.

¹⁷⁰ In particular, between the ages of six and nine, children start to feel the need to fit in to peer social groups. See Jun Zhao et al., *'I Make Up a Silly Name': Understanding Children's Perception of Privacy Risks Online*, CHI Conference on Human Factors in Computing Systems Proceedings (May 2, 2019), <https://doi.org/10.1145/3290605.3300336>.

¹⁷¹ Zara Abrams, *Why Young Brains Are Especially Vulnerable to Social Media*, APA (Feb. 3, 2022), <https://www.apa.org/news/apa/2022/social-media-children-teens> ("Starting around age 10, children's brains undergo a fundamental shift that spurs them to seek social rewards, including attention and approval from their peers.").

¹⁷² Eveline Crone & Elly A. Konijn, *Media Use and Brain Development During Adolescence*, 9 *Nature Comm.* 1, 4 (2018), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5821838/>.

unable to regulate emotional responses to social rewards.¹⁷³ This leaves minors relatively defenseless against the allure of social pressure.

Due to this heightened need for social rewards and inability to stand up to peer pressure, minors cannot avoid the harms caused by many of the design features discussed in this Petition, especially social manipulation. Design features that appear to confirm, validate, and quantify social relevance exploit minors' powerful need for social rewards.¹⁷⁴ Online operators are well aware of – and intentionally exploit – minors' developmental need for social rewards and vulnerability to social pressure.¹⁷⁵ As one neuroscientist explained, “Your kid is not weak-willed because he can't get off his phone Your kid's brain is being engineered to get him to stay on his phone.”¹⁷⁶ Instead, the peer pressure is to maintain constant connection to the app, the business, or the service.

Research confirms that minors' susceptibility to peer influence and social rewards is indeed a strong reinforcer for social media use in particular.¹⁷⁷ For example, one study found that adolescents are particularly motivated by “likes” used by social media companies and this design feature promotes continued use of social media.¹⁷⁸ Adolescents are also more susceptible to peer evaluations, meaning the number of likes or comments affects adolescents more than adults.¹⁷⁹ As discussed, there are ways to turn off some of these features on users' own posts on some social media platforms, but such options are insufficient to prevent the harms caused by these design choices.

¹⁷³ For example, adults “tend to have a fixed sense of self that relies less on feedback from peers” and “adults have a more mature prefrontal cortex, an area that can help regulate emotional responses to social rewards.” Abrams, *supra* note 171.

¹⁷⁴ Crone & Konijn, *supra* note 172; Dar Meshi et al., *The Emerging Neuroscience of Social Media*, 19 Trends Cognitive Sci. 771, 774 (2015) (“Even minimalistic cues of social success such as these may activate the brain's reward system, and keep users coming back to Facebook for more.”).

¹⁷⁵ Dunckley, *supra* note 138 (“Techniques used by video game and social media companies often exploit children's developmental vulnerabilities. For example, teens' highly elevated desire for social acceptance and fear of social rejection is a well-known aspect of their psychological development. Rather than handling this limitation with caution, proponents of behavioral design see it as a gold mine.”).

¹⁷⁶ Edwards, *supra* note 164.

¹⁷⁷ Crone & Konijn, *supra* note 172.

¹⁷⁸ Sherman et al., *supra* note 168.

¹⁷⁹ Duijvenvoorde et al., *supra* note 160, at 139.

Further, as discussed in Section II.C above, powerful psychological forces compel minors to be active on social media services with their peers, even when it seems like it might be optional for them to do so.¹⁸⁰

4. Minors lack the ability to understand persuasive intent or bias behind design features that maximize for engagement

Minors also cannot avoid the harms caused by design features discussed in this Petition because they cannot recognize and defend against the manipulative intent of these design features. The policy implications of minors' inability to defend against persuasion have been heavily discussed in the advertising context. Traditionally, researchers have found that minors cannot identify persuasive intent until the age of eight and bias until the age of twelve.¹⁸¹

As Petitioners have demonstrated in previous filings with the Commission, age stage guidelines are not reliable indicators of a minor's understanding of advertising on online platforms.¹⁸² Under the Persuasion Knowledge Model, minors exhibit advertising literacy when they (1) recognize that something is an advertisement; (2) recognize that the ad is a persuasive attempt; and (3) activate their cognitive defenses (that is, resist the attempt to be manipulated).¹⁸³ Minors develop these skills at different ages, and further, even older teens who have developed persuasive knowledge struggle to activate cognitive defenses to digital ads.¹⁸⁴

Beyond advertising, minors' vulnerability to persuasion also renders them unable to defend against manipulative design features. As discussed in Section III.B, above,¹⁸⁵ games, apps, and services conduct advanced research to build and deploy "persuasive design" features in order to maximize minors' online engagement.¹⁸⁶ These design features are designed to manipulate and persuade users to continue engagement

¹⁸⁰ See discussion *supra* Section II.C, "Social manipulation."

¹⁸¹ Dale Kunkel & Jessica Castonguay, *Children and Advertising: Content, Comprehension, and Consequences*, Handbook of Children and the Media 395, 405-07 (2011).

¹⁸² Fairplay Comments on "Protecting Kids from Stealth Advertising in Digital Media" at 5-6, <https://fairplayforkids.org/wp-content/uploads/2022/07/influencer-comments.pdf>.

¹⁸³ *Id.* at 5-7.

¹⁸⁴ *Id.* at 10-13.

¹⁸⁵ See *supra* notes 140-144 and accompanying text.

¹⁸⁶ See Lieber, *supra* note 136.

online for as long as possible.¹⁸⁷ To the extent that minors are unable to defend against persuasive intent in advertising, they also are unable to defend against persuasive design. Indeed, in one recent study, minors who knew about the autoplay function failed to distinguish between distinctly new content and online video promotions in YouTube.¹⁸⁸ This resulted in them viewing upsetting content unmasked yet lumping it under the natural experience of autoplay.¹⁸⁹

5. Young children are more trusting than adults, which leaves them vulnerable to social manipulation techniques applied by design features that maximize for online engagement

One final developmental reason that young children in particular are unable to avoid harms caused by design features that maximize for engagement is because they are trusting, especially of familiar characters. Children are more trusting than adults and they often form deep attachments to media characters, viewing those characters as friends.¹⁹⁰ Research shows that children pay more attention to and learn better from familiar characters than from unfamiliar characters.¹⁹¹

Design features that maximize for online engagement take advantage of this trust when they use familiar characters to draw users in. This manipulation begins early: a study of apps used by 3- to 5-year-old children found that parasocial relationship pressure was used to prolong gameplay or promote purchases in approximately one-fourth and one-fifth of the apps studied, respectively.¹⁹² Video platforms can exploit parasocial relationships by autoplaying videos from characters and media figures that minors are familiar with to keep them engaged online. In one study, a ten-year-old girl

¹⁸⁷ Aditya K. Purohit et al., *Designing for Digital Detox: Making Social Media Less Addictive with Digital Nudges*, CHI Conference on Human Factors in Computing Systems Extended Abstracts (April 2020), <https://dl.acm.org/doi/10.1145/3334480.3382810>; Edwards, *supra* note 164.

¹⁸⁸ Zhao et al., *supra* note 170.

¹⁸⁹ *Id.*

¹⁹⁰ Bradley J. Bond & Sandra L. Calvert, *A Model and Measure of US Parents' Perceptions of Young Children's Parasocial Relationships*, 8 *J. Child. Media* 286 (2014), <https://doi.org/10.1080/17482798.2014.890948>.

¹⁹¹ Marisa Meyer et al., *Advertising in Young Children's Apps: A Content Analysis*, 40 *J. Dev. Behav. Pediatr.* 32 (2019), <https://pubmed.ncbi.nlm.nih.gov/30371646/>; Kaitlin L. Brunick et al., *Children's Future Parasocial Relationships with Media Characters: The Age of Intelligent Characters*, 10 *J. Child Media* 181 (2016), <https://www.tandfonline.com/doi/abs/10.1080/17482798.2015.1127839>.

¹⁹² Radesky et al., *supra* note 72, at 6.

stated that she was okay with video recommendations on autoplay because the platform recommended a video from one of her favorite YouTubers.¹⁹³ Further, studies show that young children are not likely to greet trusted characters with skepticism even if they are being used to sell products or push more content.¹⁹⁴

C. Parents and guardians are not able to protect minors from online injury

Not only are minors unable to reasonably avoid the harms caused by optimization for engagement, but parents and guardians are not able to protect their children from these harms, either. There are several reasons for this.

The first and most important reason is that it is not logistically feasible for parents to directly supervise every moment of their children's internet use. In 2021, 8- to 12-year-olds spent more than 5.5 hours viewing entertainment screen media each day.¹⁹⁵ This does not include time using screens for school or homework,¹⁹⁶ though minors often are required by school to spend time online – including during hours when parents are not with them – and increasingly are given or required to have their own devices for educational purposes.¹⁹⁷ Parents struggle to find time to monitor their children's online activities, and that is especially the case for single parents and parents who work multiple jobs.¹⁹⁸ In addition, compared to televisions, many internet-enabled devices are small personal devices that can be used quietly or with headphones, making it difficult for parents to see or listen in on their children's online activity and content casually and from a distance, without hovering.

¹⁹³ Zhao et al., *supra* note 170.

¹⁹⁴ Walsh & Walsh, *supra* note 162.

¹⁹⁵ Victoria Rideout & Michael B. Robb, *The Common Sense Census: Media Use by Kids Age Zero to Eight, 2020*, Common Sense Media, 7 (2020), https://www.commonsensemedia.org/sites/default/files/research/report/2020_zero_to_eight_census_final_web.pdf.

¹⁹⁶ *Id.*

¹⁹⁷ *Common Sense Files Comments to Federal Trade Commission on Cross-Device Tracking of Children and Teens* (press release), Common Sense Media (Dec. 17, 2015), <https://www.commonsensemedia.org/press-releases/common-sense-files-comments-to-federal-trade-commission-on-cross-device-tracking-of-children-and-teens>.

(In the context of educational technology used in schools, “a student could find herself on multiple Internet-connected devices a day as a precondition of receiving a public education.”).

¹⁹⁸ See generally Pooja Tandon et al., *Home Environment Relationships with Children's Physical Activity, Sedentary Time, and Screen Time by Socioeconomic Status*, 9 *Int'l J. Behav. Nutrition Physical Activity* 7 (2012) (discussing how parents in low socioeconomic status families may lack the time to supervise their children in the neighborhood).

When parents attempt to limit or regulate their children’s online activity in the face of these intentionally manipulative design features, they struggle to do so. Indeed, management of minors’ online activities is a major source of conflict within families. Research shows that starting in the toddler years, the engagement-promoting features of tablet apps might result in behavioral dysregulation after tablet play ends, as compared with the easier transition from engagement with a printed book.¹⁹⁹ A 2016 report by Common Sense Media found that 70% of American teenagers between ages 12 and 18 fight with their parents about their devices – thirty-two percent on a daily basis.²⁰⁰ Further, minors are using many different platforms and services; expecting parents to understand, monitor, and adjust settings across multiple platforms is not realistic.

Parents sometimes attempt to protect their children from online harms by using parental controls or other parent-oriented settings, but may find they cannot, due to confusing and misleading defaults and setting choices. For example, Hulu, Netflix, YouTube, and Amazon Prime all permit users to disable autoplay, but enable autoplay by default and may make it difficult to disable. Consider Netflix, which does not allow users to turn autoplay off in the Netflix mobile app – or even inform users anywhere within the app that autoplay can be disabled. Autoplay can be disabled, but to do so, a parent must log in to their account through a web browser and enter the settings panel from there. Further, these solutions are specific to the individual platform; it requires tremendous time and energy for a parent or guardian to go through each and every platform a minor may use. Again, that is an unrealistic and unreasonable expectation of parents.

In addition, many of the design features addressed in this Petition actively undermine parents’ attempts to select content for their children, thus frustrating parents’ ability to avoid harms caused by inappropriate content. As discussed above, many of these design features harm minors by surfacing harmful content. Even when parents attempt to hand-select content themselves, as they may do for young children, design features such as autoplay and endless scroll automatically select and play or

¹⁹⁹ Tiffany G. Munzer et al., *Tablets, Toddlers and Tantrums: The Immediate Effects of Tablet Device Play*, 110 *Acta Paediatrica* 255, 255-56 (2020), <https://europepmc.org/article/pmc/pmc7749045>.

²⁰⁰ *Technology Addiction: Concern, Controversy and Finding a Balance*, Common Sense Media, 3 (2016), https://www.commonsensemedia.org/sites/default/files/research/report/csm_2016_technology_addiction_research_brief_0.pdf.

suggest subsequent content that the parent did *not* choose. According to research conducted by Common Sense Media examining the media habits of 5- to 8-year-olds, “among the 95% in this age group who watch online videos, the children themselves are most likely to select what to watch (rather than the parent), either through their own searching, autoplay, or ‘suggested’ videos on the platform or from channels the child follows.”²⁰¹ These design choices deliberately remove parents from influencing or stopping undesired content from reaching their child.

Requested Action

To address the prevalent unfair and deceptive practices described above, Petitioners urge the FTC to adopt a rule prohibiting these practices. Section 18(a)(1)(B) of the FTC Act (15 U.S.C. 57a(1)(B)) gives the FTC authority to prescribe rules that “define with specificity . . . unfair or deceptive acts or practices in or affecting commerce.”²⁰² As Petitioners have explained above, it is within the FTC’s authority to prohibit use of the design features described in this Petition because these practices are prevalent and categorically unfair when used on minors.

The FTC must act to stop the use of these harmful practices on minors. Engagement optimization is lucrative, because it drives up revenue earned through multiple avenues. Without FTC intervention, these practices will continue and likely will intensify, becoming only more tailored to an individual.²⁰³ As noted in the Petition above, businesses are incentivized to focus on targeting minors for profit, not for protection due to the fact that advertising targeted at them and data being collected from them is profitable.

The Commission’s trade regulation rulemaking authority is the agency’s best tool to provide relief from the harms manipulative design wrecks on kids and teens.²⁰⁴ The harms caused by these practices cannot be sufficiently mitigated by enforcement of the COPPA Rule, individual Section 5 enforcement actions, and FTC guidance alone. First, COPPA’s scope is limited to the collection, storage, and use of data collected from

²⁰¹ Rideout & Robb, *supra* note 195.

²⁰² 15 U.S.C. § 57a(a)(1)(B); 16 CFR §1.8(a), <https://www.govinfo.gov/link/uscode/15/57a>.

²⁰³ Lauren E. Willis, *Deception by Design*, Loyola Law School, Los Angeles Legal Studies Research Paper No. 2020-25, 34 Harv. J. L. Tech. 115 (January 10, 2022), <https://ssrn.com/abstract=3694575>.

²⁰⁴ *See* 15 U.S.C. § 57a(a)(1)(B); 16 C.F.R. § 1.8(a).

minors. It is not concerned with design practices that abuse the unique psychological vulnerabilities of kids and teens. Second, individual enforcement actions may help address the worst actors within industries, but the use of deeply harmful design practices on minors is so prevalent and systemic that individual enforcements in this area will always be insufficient. A case-by-case approach would also not provide sufficient clarity to companies about which types of design practices are lawful and which are not. Third, although the FTC has issued much beneficial guidance on how parents can educate their kids about potential harms faced online,²⁰⁵ this guidance does not speak to unique psychological and physical risks to young people when platforms cause extended online engagement. And finally, guidance does not adequately incentivize changes in harmful behavior on the part of digital designers.

In light of the foregoing, the Commission should adopt a rule prohibiting design features that maximize minors' engagement with online platforms. In such a rule, the design practices outlined above should be categorically prohibited. We urge the FTC to adopt the following:

Prohibited Practices.

Unfair or deceptive acts or practices. In delivering an online website or service to a minor, it is an unfair or deceptive practice to employ certain features designed for the purpose of maximizing users':

- (a) time spent on the website or service, including as measured by duration or frequency, or
- (b) activities performed on the website or service, including viewing content, posting content, playing games, making purchases, sharing private information, connecting with new people or products, or viewing ads.

Prohibited practices include:

(a) Low-Friction Variable Rewards.

- (i) Rewarding content or virtual items offered by a website or service that:
 - (1) Are awarded to users for mere scrolling, tapping, and/or opening or logging into the website or service;
 - (2) Vary unpredictably in type, amount, and/or timing; and

²⁰⁵ *Protecting Kids Online*, Federal Trade Commission Consumer Advice, <https://consumer.ftc.gov/identity-theft-and-online-security/protecting-kids-online>.

- (3) Generally increase as a minor spends more time on the website or service, or visits it more frequently.
- (ii) Examples of prohibited variable reward design features include:
 - (1) **Endless Scroll and Autoplay with Variable Content.** Variable content loaded continuously without interruptions or pauses.
 - (2) **Variable Reward Notifications and Nudges.** Notifications and nudges that do not originate from a minor's individual connections or preferences on an online website or service that encourage minors to return to the online website or service at variable intervals to receive a reward.

(b) Navigation Manipulation.

- (i) Design features that:
 - (1) Make it difficult for a minor to navigate out of a content stream or exit an online website or service; or
 - (2) Encourage seamless and continuous use of a website or service without any stopping cue(s);
 - (3) Except when the primary function is to instruct minors on the functionality of, or offer narrative information central to, the website or service.
- (ii) Examples of prohibited navigation manipulation design features include:
 - (1) **Difficult Navigability.** Features that make it difficult for minors to maneuver out of a content stream or back to the home screen without viewing additional content.
 - (2) **Autoplay.** Functionality that makes the next piece of content play automatically, without requiring an action from the minor.
 - (3) **Strategically Timed Advertisements.** Advertisements that pop up when a minor attempts to navigate to another part of the website or online service, such as back to the main menu, on to another round of a game, or out of the website or online service altogether.

(c) Social Manipulation.

- (i) Design features that:
 - (1) Leverage a minor's desire for social relationships to encourage greater time spent and/or activities performed on the website or service.
- (ii) Examples of prohibited social manipulation design features include:
 - (1) **Quantified Popularity of a Minor's Account or Content.** Displaying a quantified tally of the number of connections or

interactions for a minor's account or piece of content, such as followers, views, likes, dislikes, or comments.

- (2) **Named Popularity.** Displaying the names, usernames, or other known identifiers of specific other users who have interacted with a particular piece of content, such as by viewing, liking or disliking, or commenting on it.
- (3) **Interaction Streaks.** Features that quantify interactions between users, creating pressure for interactions to continue so that the streak value continues to increase.
- (4) **Parasocial Relationship Pressure.** The use of an artificial or animated character or a popular influencer on a website or service to pressure or shame a minor into taking a certain action, such as when a game character uses insulting language or pressure to manipulate the minor into continuing to play a game, coming back at another time, making a purchase, or sharing personal information.
- (5) **Incentivized Reach to Larger Audience.** Prompting a minor to make their account visible to, or otherwise share content with, users with whom they are not already connected, or defaulting to these settings.

Conclusion

For the foregoing reasons, Petitioners respectfully urge the FTC to promulgate a rule prohibiting prevalent design features that maximize minors' engagement with online platforms and that are categorically unfair.

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Respectfully submitted,

Center for Digital Democracy

Fairplay

Accountable Tech

American Academy of Pediatrics

Becca Schmill Foundation, Inc.

Berkeley Media Studies Group

C. Everett Koop Institute at Dartmouth

Center for Humane Technology

Children and Screens: Institute of Digital

Media and Child Development

Eating Disorders Coalition

Electronic Privacy Information Center
(EPIC)

LookUp.live

Lynn's Warriors

Network for Public Education

Parent Coalition for Student Privacy

ParentsTogether

Protect Young Eyes

Public Citizen

Together for Girls

UConn Rudd Center for Food Policy and
Health

U.S. Public Interest Research Group

November 17, 2022

* This request for investigation was drafted with considerable assistance from student attorneys Luke Evans, Adwait Jawale, Caroline Kracson, Katarina Mattmuller, Eve Maynard, John Eagle Miles, Philip Reisen, Annie Scantling, and Quinten Stewart, and teaching fellow Victoria Tang in the Communications & Technology Law Clinic at Georgetown Law.

Appendix: Unfair Design Practices Exhibits

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A. Introduction & Methodology

This appendix comprises screenshots from games and social media applications found on the Google Play Store informally surveyed by Petitioners.¹ Because of the immense digital footprint left by only a handful of social media apps (such as Facebook, Snapchat, TikTok, etc.) in comparison to the plethora of gaming apps on the market, the examples within this appendix come mostly from gaming apps rather than social media apps. We chose social media apps based on research demonstrating their popularity amongst teenagers, particularly Facebook, Snapchat, Instagram, TikTok, and YouTube.²

These games were informally reviewed by two students in the Georgetown Communications & Technology Law Clinic who chose games based on a variety of sources to reduce bias, such as the most downloaded and recommended games on the Google Play Store, online ranked lists, word of mouth, and a given game's artwork or appearance. The students played these games throughout October of 2022. A full list of the games played can be found [here](#).

Three factors were considered in choosing the games listed here. First, we chose games that had been downloaded at least over 1 million times according to the Google Play Store, with the majority (58%) being downloaded over 50 million times.³ Second, we considered the Entertainment Software Rating Board (ESRB) rating given for each game and only considered games that were rated for Teens or lower, with the vast majority of games we chose to play (68%) being rated for Everyone. Finally, we aimed to include games that could clearly be enticing or appealing for children to play based on their art styles and appearance, as well as only choosing games that were free-to-play.

We played 60 games from the Google Play Store. Of those 60, we found 36 (60%) that had manipulative design practices meeting the definitions set forth in the Petition for Rulemaking that this appendix accompanies. Within those 36 games, we found 15 examples of low-friction variable rewards (25%), 25 examples of navigation

¹ With the exception of YovoGame's *Doctor for animals*, all games played were also available on the Apple App Store.

² See, e.g., Emily A. Vogels et al., *Teens, Social Media and Technology 2022*, Pew Research Center (Aug. 10, 2022), <https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/>.

³ The Apple App Store does not disclose download numbers for its apps, hence these numbers in reality are likely much larger.

manipulation (42%), and 18 examples of social manipulation (30%). We believe that these statistics and examples, along with the arguments presented in our Petition, “indicate[] a widespread pattern of unfair or deceptive acts or practices” within the meaning of 15 U.S.C. § 57a(b)(3)(B), and therefore establish prevalence.

<u>Categories:</u>	<u>Count:</u>	<u>Percentage:</u>
Total Number of Games Played:	60	N/A
Number of Games Found with Deceptive Practices:	36	60%
Number of Low-Friction Variable Reward Examples:	15	25%
Number of Navigation Manipulation Examples:	25	42%
Number of Social Manipulation Examples:	18	30%

<u>Game Ratings:</u>	<u>Count out of 60 Games:</u>	<u>Percentage:</u>
Number of Total Games Rated E:	41	68%
Number of Total Games Rated E 10+:	11	18%
Number of Total Games Rated T:	8	13%

<u>Number of Total Games Downloaded:</u>	<u>Count out of 60 Games:</u>	<u>Percentage:</u>
1 Million+	60	100%
5 Million+	55	92%
10 Million+	51	85%
50 Million+	35	58%
100 Million+	23	38%
500 Million+	3	5%
1 Billion+	2	3%

B. Low Friction Variable Rewards

1. Variable Rewards in Games



In the popular game "SpongeBob: Krusty Cook-Off" from Tilting Point LLC, the player is periodically given rewards chests containing a variety of in-game items.



In the popular game "Cat Runner: Decorate Home" from Ioy, the player can receive Game Boxes and Free Boxes that offer variable rewards. Sometimes Game Boxes are offered for free, otherwise they cost 500 gold. While some prizes are rare, the reward is more likely to be worth less than the cost of the box, as shown above.



In “DragonCity” from Social Point, the player is prompted to receive a daily variable reward when logging in. Although the calendar displays the item category, the specific quantity is kept unknown. (see top images). There is also a “Lucky Lair” variable reward game that allows the user to potentially earn rare prizes and treasure chests, leading to further low-friction variable rewards (see bottom images).



In "Go! Dolliz: Dress Up" from Dramaton, the user may claim daily rewards, some of which are unpredictable, such as the rewards displayed above for day 2 and day 5.



In "Harry Potter: Hogwarts Mystery" from Jam City, Inc., the player is awarded chocolate frog cards that vary in rarity at random intervals throughout the game.



In the popular game, "Hello Kitty Nail Salon" from Budge Studios, the player is periodically presented with gift boxes that, when clicked upon, award new surprise items.



In "Hello Kitty World 2: Sanrio Kaw" from Access Bright Japan, Inc., the user is able to receive daily gift boxes (top) and earn points via gameplay to spin a roulette wheel which gives variable rewards (bottom).



In "Love Nikki: Dress Up Queen" from Elex, the player can win daily variable rewards via the Room of Mystery: Pavilion of Mystery. The player is instructed to periodically do so in the game's tutorial (see above).



In "Love Nikki: Dress Up Queen" from Elex, the player can also draw variable prizes in Dream Island, with higher chances of winning for each consecutive draw.



Finally, "Love Nikki: Dress Up Queen" from Elex has a lucky draw box that offers daily variable-rewards. The player may receive double rewards after accruing 100 "luck" points by logging in daily. Failure to log in results in a loss of 50 luck points.



In the popular game, “My Talking Angela Two” from Outfit7 Limited, the player can spin a wheel every day to receive a free random reward.



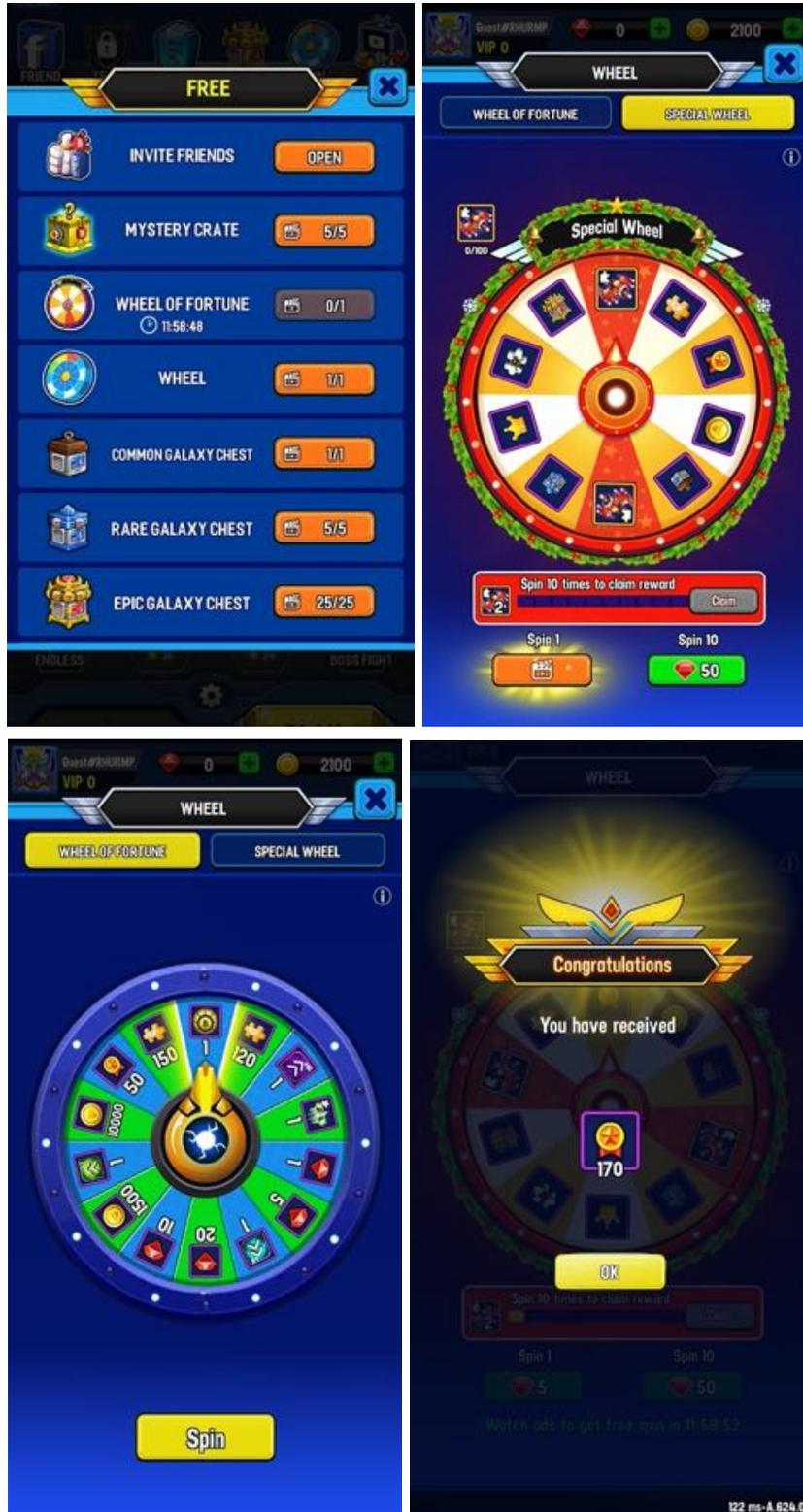
In the popular game, “My Talking Tom” from Outfit7 Limited, the player can spin a wheel every day to receive a free random reward. The player can receive additional spins if they watch an advertisement.



In “PK XD: Fun, Friends, and Games” from Afterverse Games, the player receives a daily prize. After claiming prizes for 5 consecutive days, the player may claim a random surprise chest.



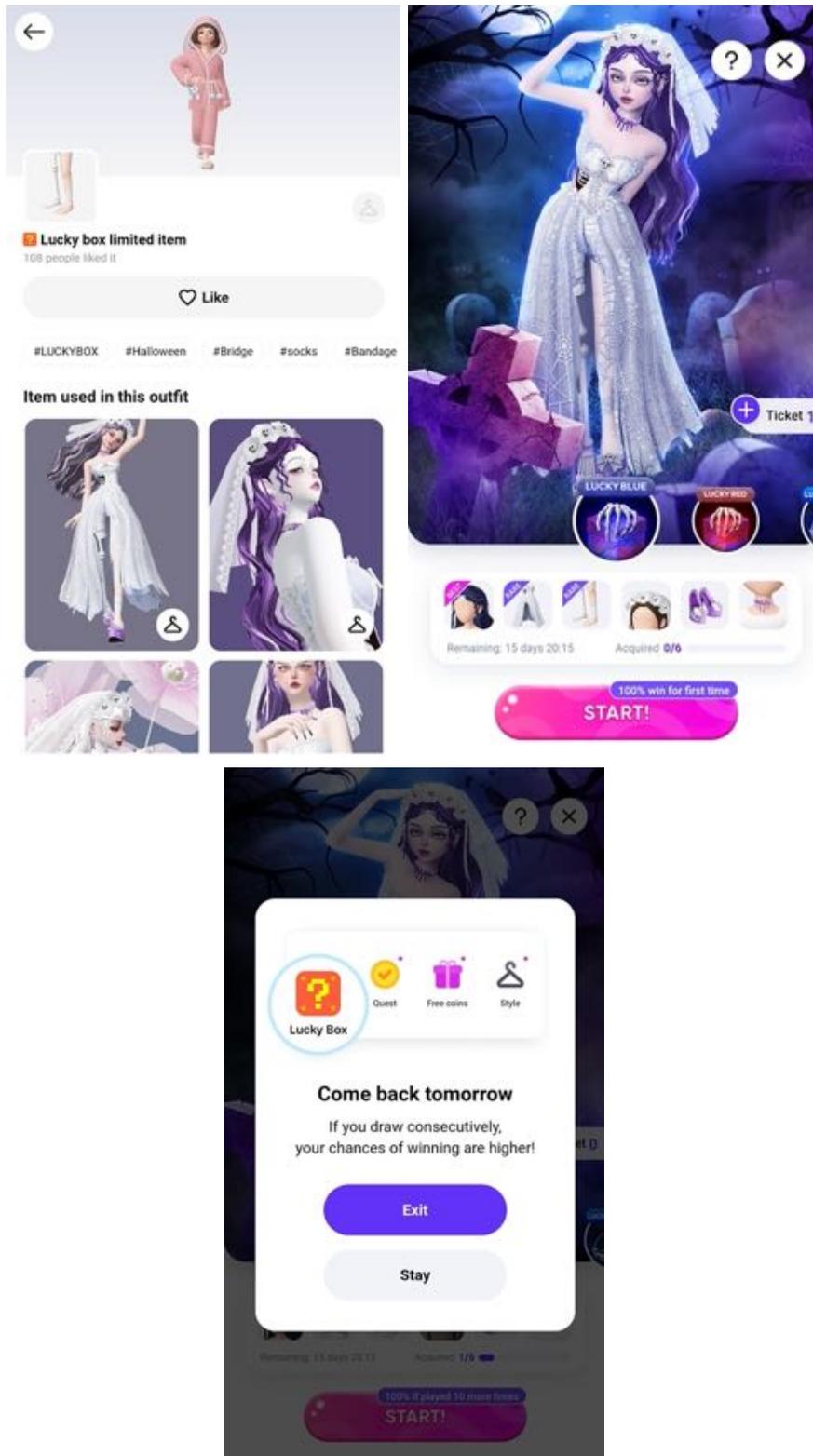
In “My Tamagotchi Forever” from BANDAI NAMCO Entertainment Europe, the player can spin a wheel offering free variable rewards if they watch an advertisement. After the first spin, the player is offered to watch another video for a second spin.



In "Space Shooter" from ONESOFT GLOBAL PTE LTD, the player can receive free variable rewards in numerous ways as displayed under the "FREE" tab (top left), such as the special wheel (bottom left) and wheel of fortune (top and bottom right).



“Star Wars: Galaxy of Heroes” from Electronic Arts features bronzium data cards that offer the player variable rewards.



In “Zepeto” from Naver Z Corporation, the user is offered to draw a lucky box to win variable rewards, including components of a limited edition outfit. The player’s chances of winning outfit items are higher when they draw consecutively.



In "Talking Tom: Gold Run" from Outfit7 Limited, the player frequently encounters vaults in game-play which offer variable rewards.

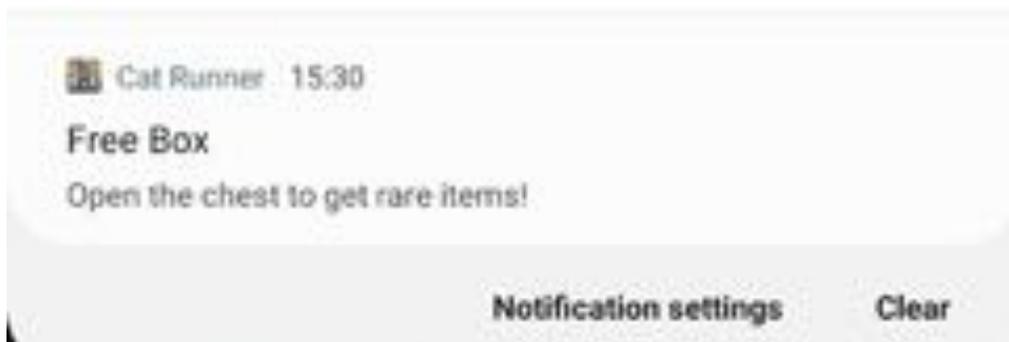


In "Lords Mobile" from I Got Games (IGG), the game has daily login variable gifts and interest rewards for players to obtain.



In "Squishy Magic" from Dramaton, playing through levels far enough will unlock variable rewards. Earning stars from doing orders increases the percentage of the random gift; hitting 100% unlocks it.

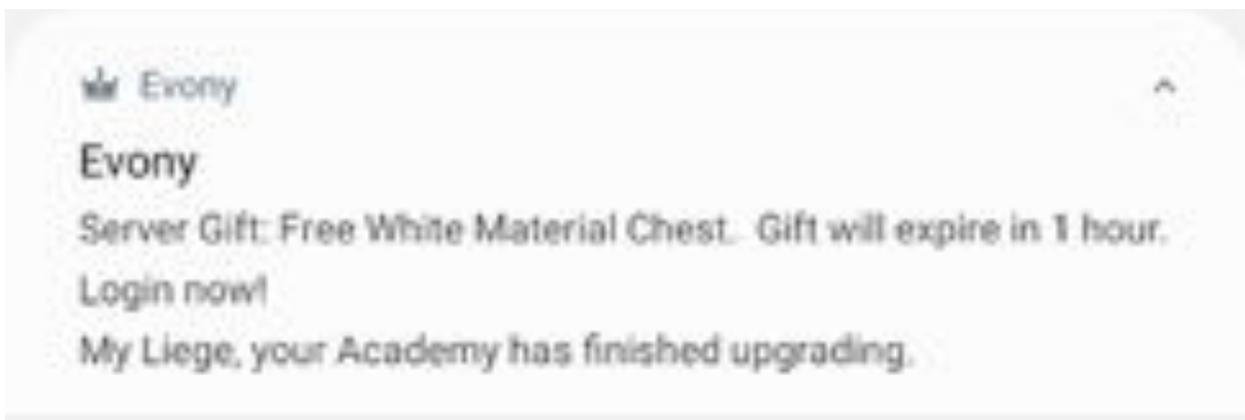
2. Nudges



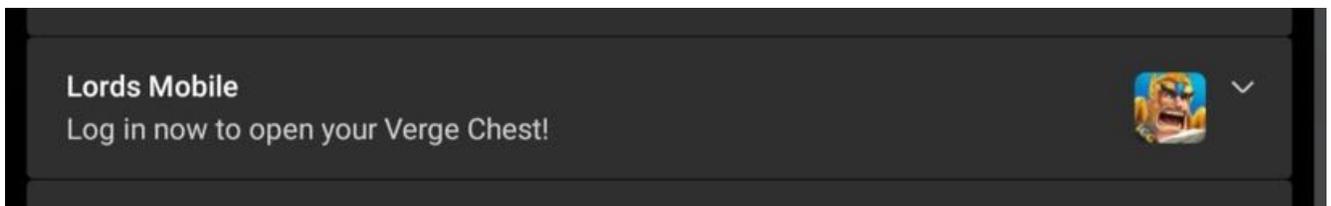
In the popular game, "Cat Runner: Decorate Home" from Ioy, the player periodically receives phone notifications to return to the app and open a free box with variable rewards.



In the popular game, “PK XD: Fun, Friends, and Games” from Afterverse Games, the player receives a daily phone notification to return to the app and receive free coins that vary in quantity



In the popular game, “Evony: The King’s Return” from TG Inc., the player frequently receives phone notifications about free chests containing variable rewards, prompting the user to return to the game before they expire.



In “Lords Mobile” from I Got Games (IGG), periodic notifications are given to open ‘Verge Chests’ to unlock free variable rewards. See Appendix for more examples of Low-Friction Variable Rewards.

C. Navigation Manipulation

1. Difficult Navigability



An ad for the game "Township" from Playrix is itself playable and takes the user directly to the download screen for the app.



In “Project Makeover” from Magic Tavern, Inc., an advertisement in the game encouraging you to play a level has no exit option. Players must choose to play a level to proceed.



In “animal restaurant” from DH-Publisher, the game continuously plays in the background as users navigate the menus. Additionally, if the player ceases to tap the screen for approximately 10 seconds, a paw icon and floating text on screen encourages players to tap the “Flyer Promo” button in the bottom-right corner in order to have more customers arrive in the restaurant to interact with.



In "Chibi Island" from Nexters Global, an in-game offer can be seen with an obscured exit button in the top-right corner.



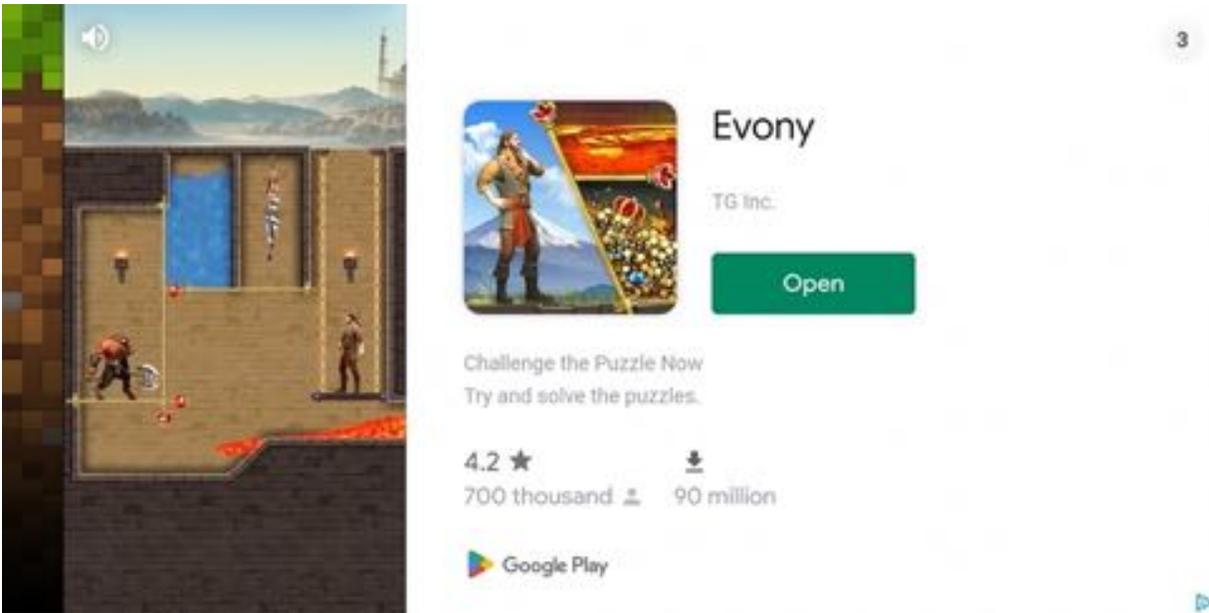
In "Subway Surfers" from SYBO Games, a player needs to only tap anywhere on screen to start a game. This makes navigating the menu difficult as mistapping can cause the game to immediately start as occurred during Petitioner's research.



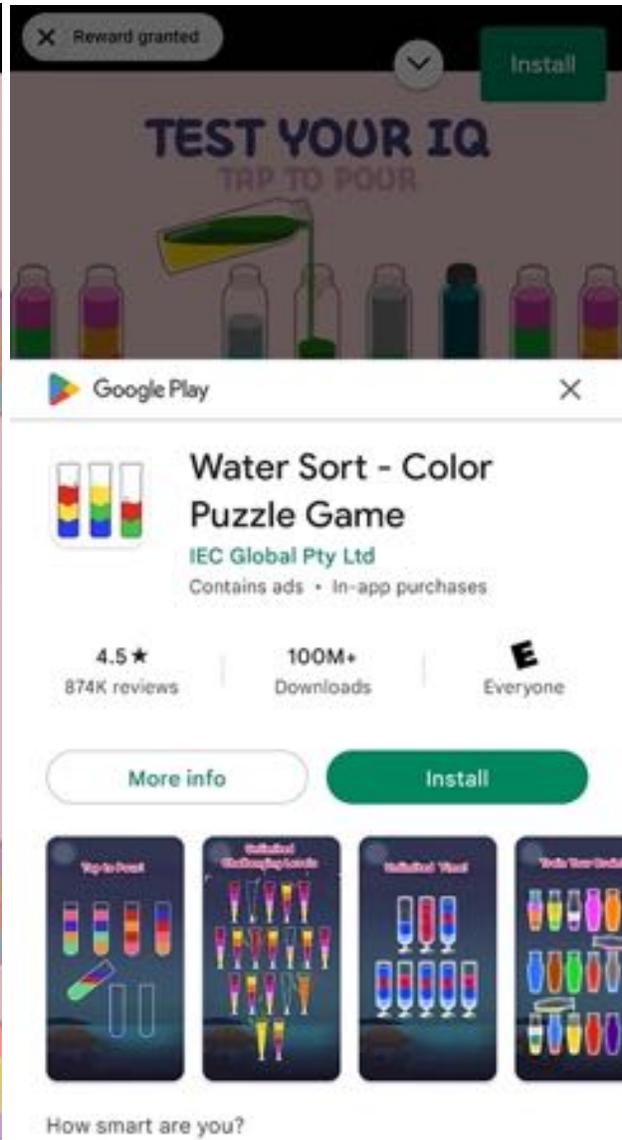
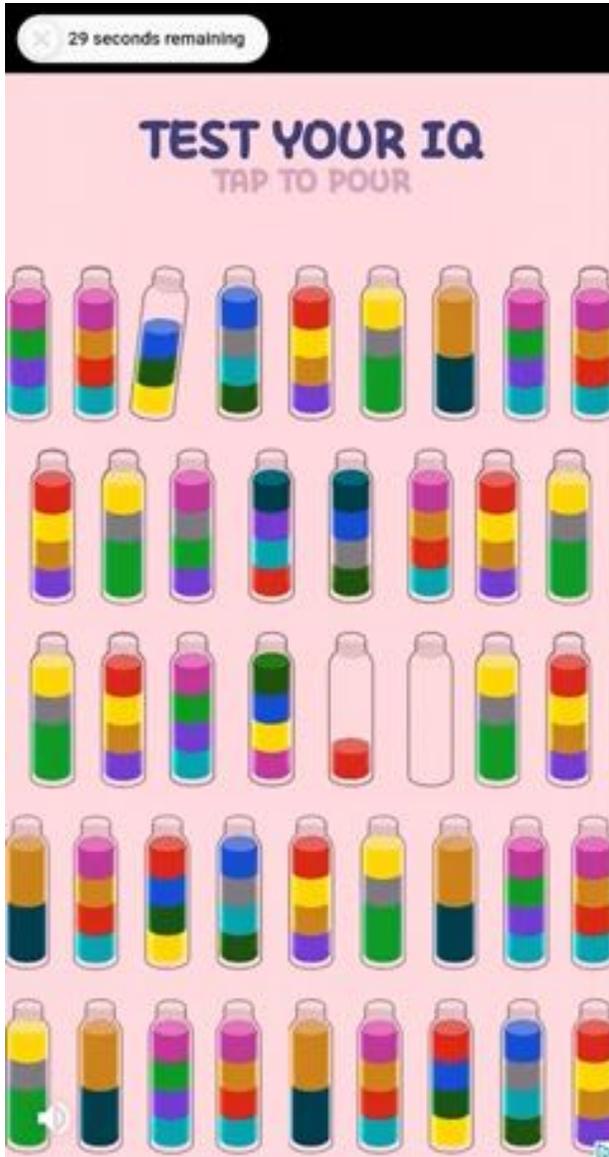
In "Cat Runner: Decorate Home" from Ivy, advertisements pop-up on the top of the screen during gameplay, typically involving fast food, without any exit button or indication that it is an advertisement.



In "Harry Potter: Hogwarts Mystery" from Jam City, Inc., pop-up advertisements for in-game purchases appear frequently throughout gameplay. As shown above, these pop-ups have no visible exit button and force the user to click "Show Me!" before they may navigate back to gameplay.

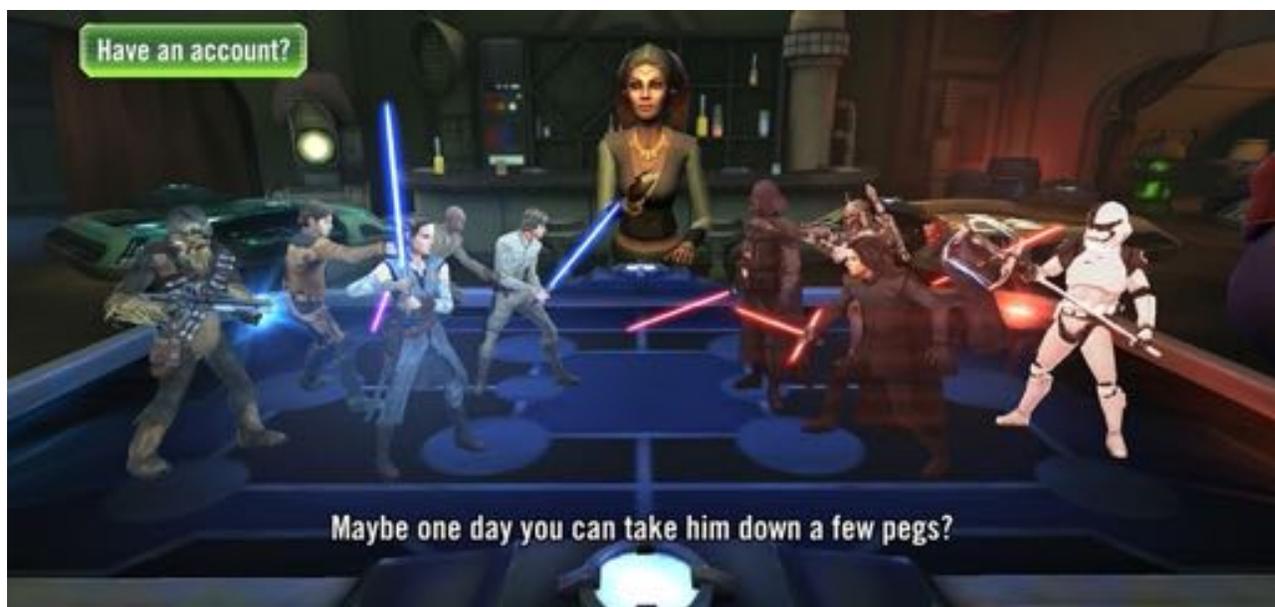


In "Craft School Monster Class" from ABI Global LTD, the player, after completing a level, is presented with a sparkling chest offering triple rewards (top). If the player clicks this chest, they are redirected to an advertisement that cannot be closed until the timer expires (bottom) thereby manipulating the player into unintentionally navigating away from gameplay to receive triple rewards.

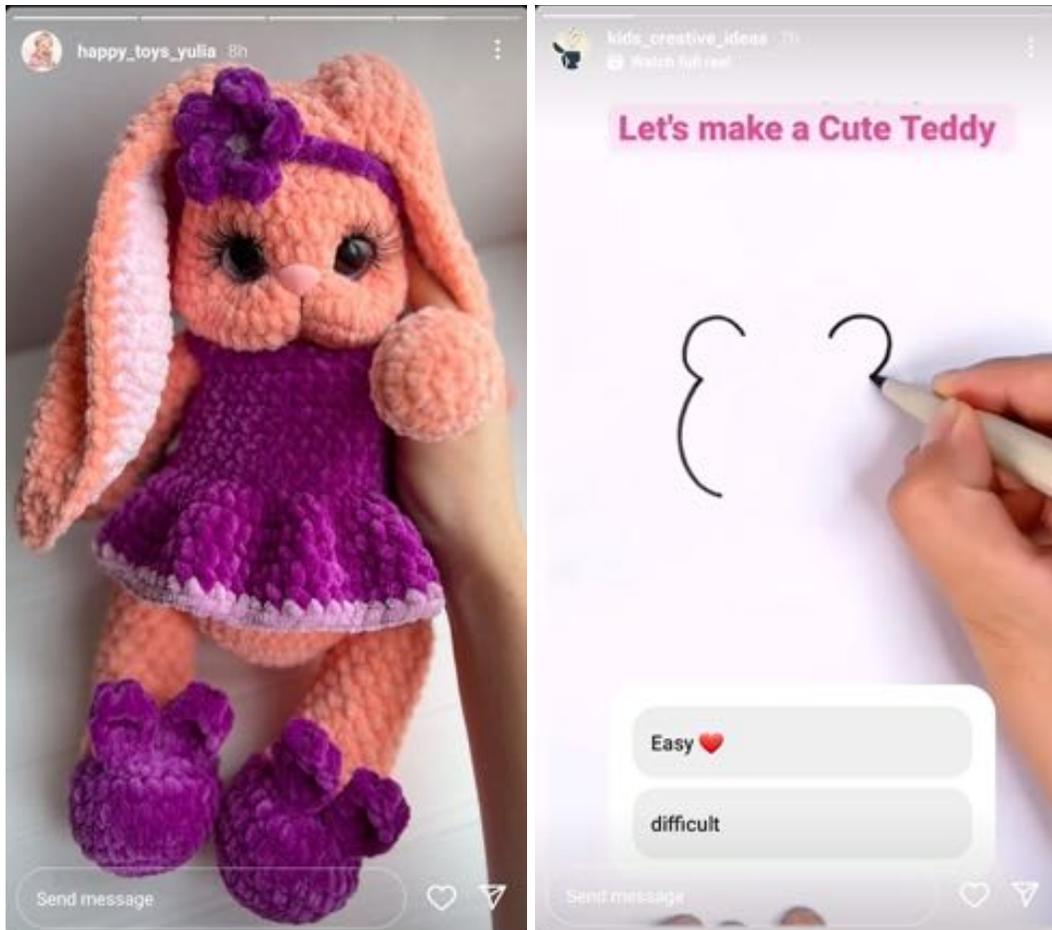


In "Space Shooter" from ONESOFT GLOBAL PTE LTD, players are presented playable advertisements that cannot be navigated away from until the timer expires. Even after clicking the exit button once it appears, the player is presented with an app store tab to download the game.

2. Autoplay

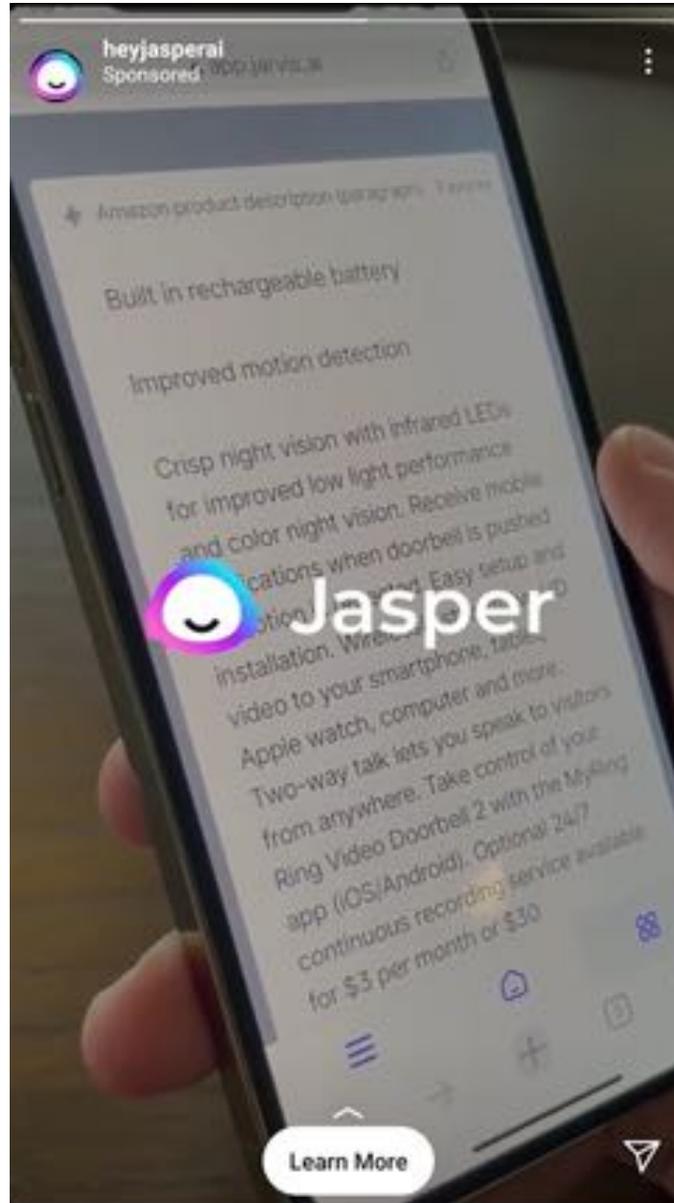


In "Star Wars: Galaxy Heroes" from Electronic Arts (EA) there are cutscenes, such as this one at the beginning of the game, which plays automatically with no pause or exit feature.

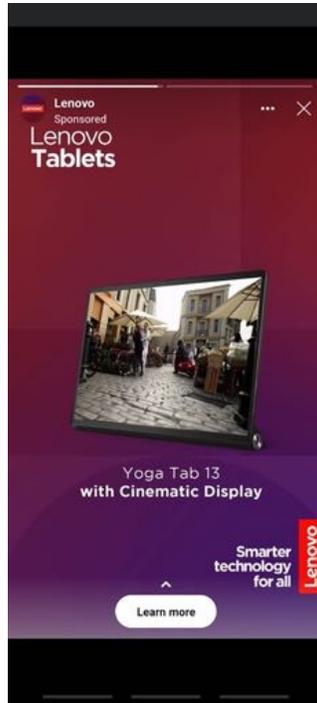


When an Instagram user views stories of an account they follow, once the timer bar at the top of the screen becomes opaque, they are automatically presented with either the next story posted by that account, or another account's story reel.

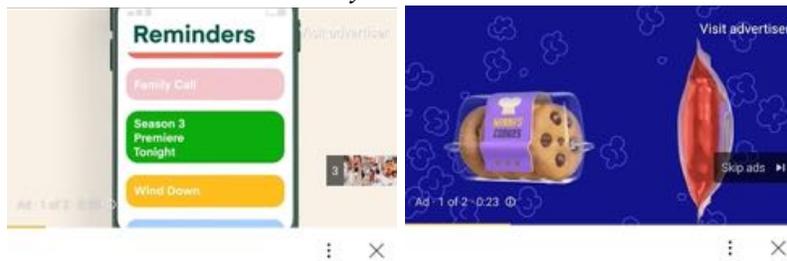
3. Strategically Timed Advertisements



Sponsored advertisements on Instagram stories are seamlessly included between stories posted by accounts the user actually follows.



Similarly, Facebook stories also have advertisements placed between stories by accounts the user follows.



Instacart



Instacart



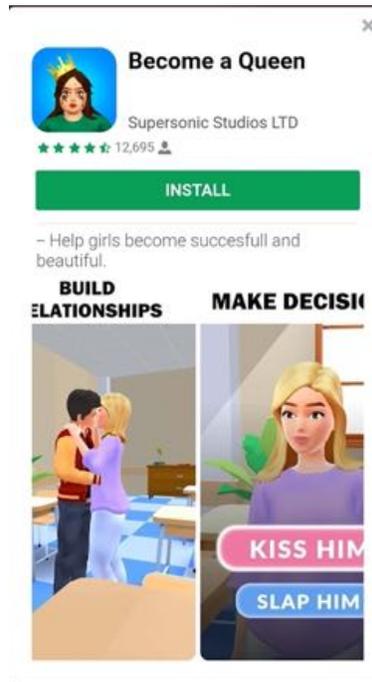
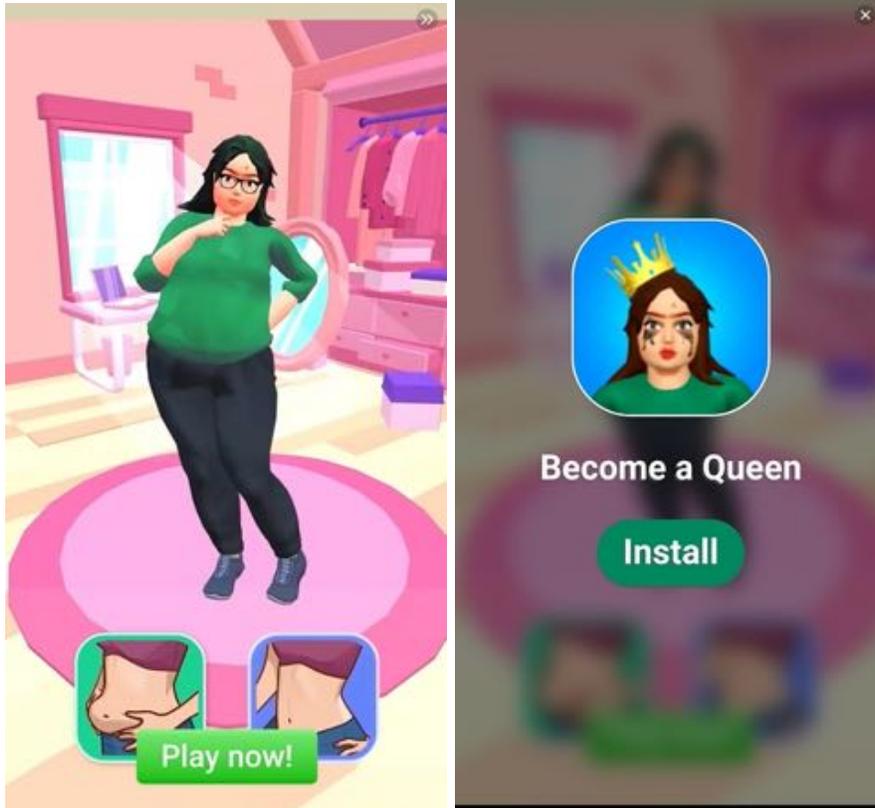
YouTube includes advertisements in the middle of videos, which have set timers ranging from 5 to 15 seconds before the user may press "skip."



In “Miss Hollywood: Vacation” from Budge, immediately after earning a prize, the player must view a video ad for another Budge game for approximately five seconds before they can open the prize.



In “Doctor for animals” from YovoGames, timed advertisements, such as this ad for “Fidget Toys 3D,” frequently pop-up when the player completes tasks or navigates to a different page in the game. The player cannot navigate away from the advertisement until the timer expires.



In the popular young girls' game, "Monster High Beauty Shop" by CrazyLabs LTD, timed pop-up advertisements such as this appear after the player dresses up a character or navigates to another page in the app. Even when the timer expires, clicking the exit button directs the user to the app store to install the app.



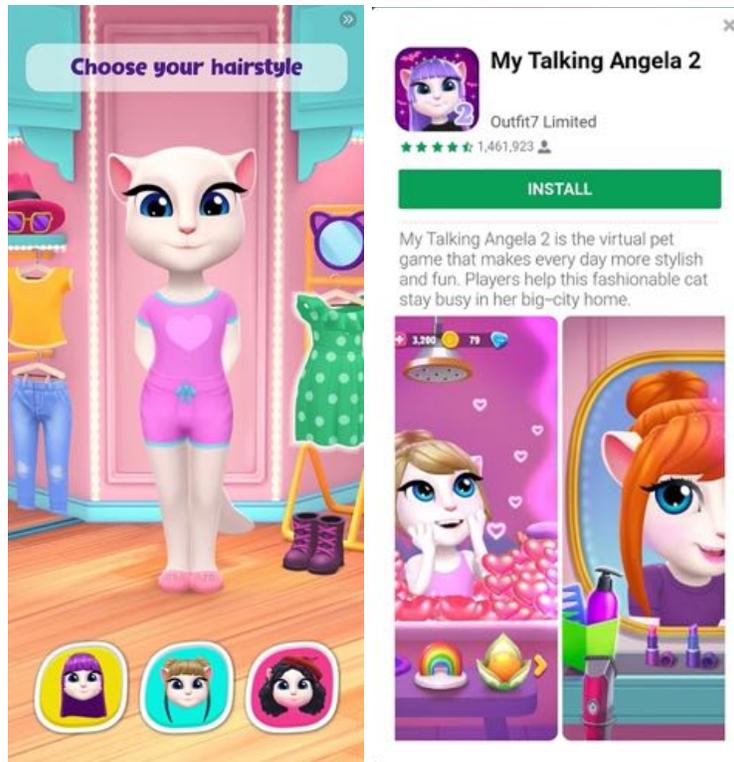
In "DragonCity" from Social Point, in-game-purchase-offers frequently pop-up when opening the app. The exit buttons are concealed within the color/design of the advertisement. The three advertisements shown above appeared consecutively, and researchers found up to seven in-game pop-up ads appear consecutively after opening the app.



In "Baby Care" from YovoGames, advertisements are subsequently played after a user has played in different game modes and decides to exit.



In "Pokémon Cafe ReMix" from the Pokemon Company, advertisements such as this would randomly appear as players navigate the menu and play through levels.



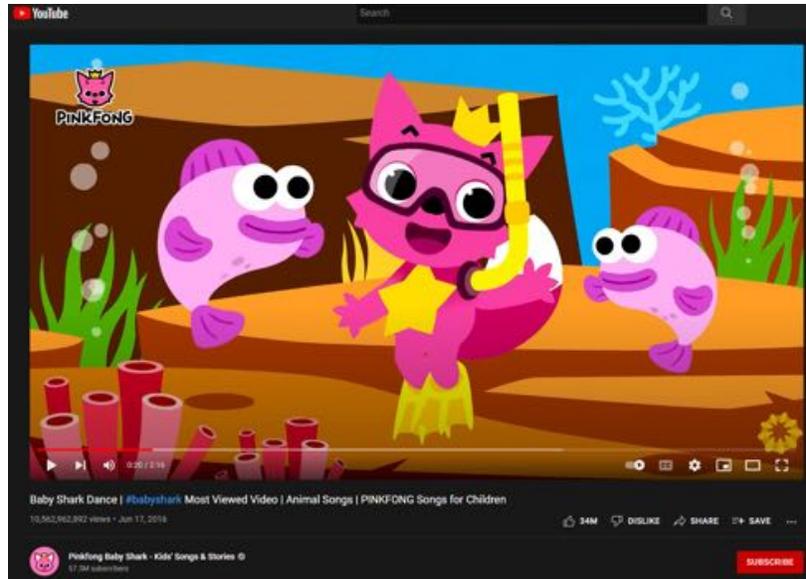
In “Go! Dolliz: Dress Up” from Dramaton, interactive pop-up ads timed for up to 30 seconds appear after the player finishes dressing up a doll or navigates to the main menu. When the timer expires, the advertisement immediately directs the player to the play store to download the app.



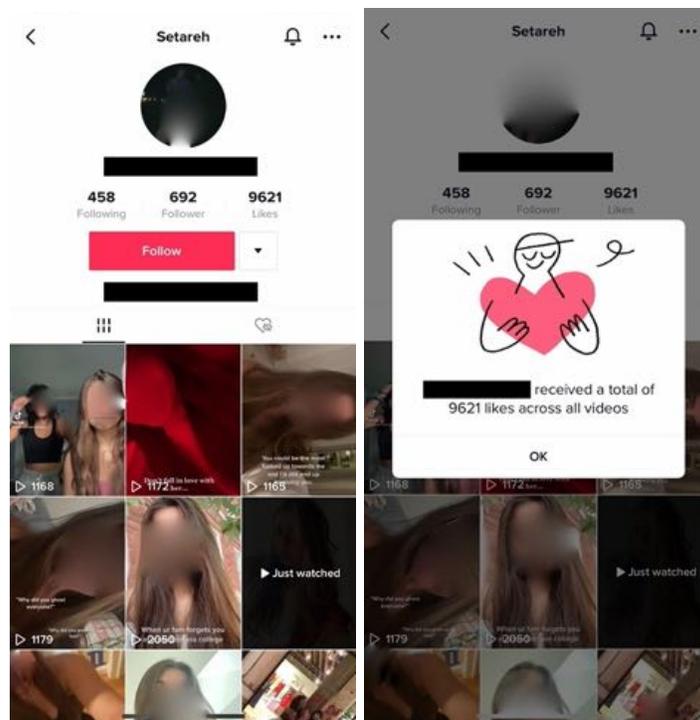
In “My Tamagotchi Forever” by BANDAI NAMCO Entertainment Europe, timed interactive pop-up advertisements appear, such as this ad for “Space Shooter”, compelling a user to click or “play” in an ad in order to continue game play.

D. Social Manipulation

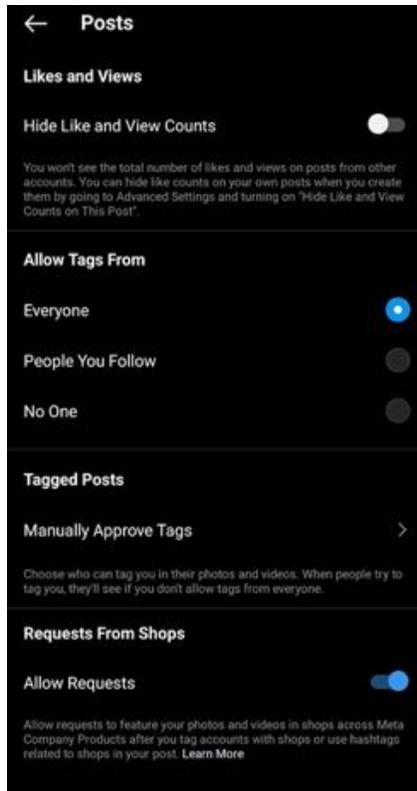
1. Quantified Popularity of a Minor's Account or Content



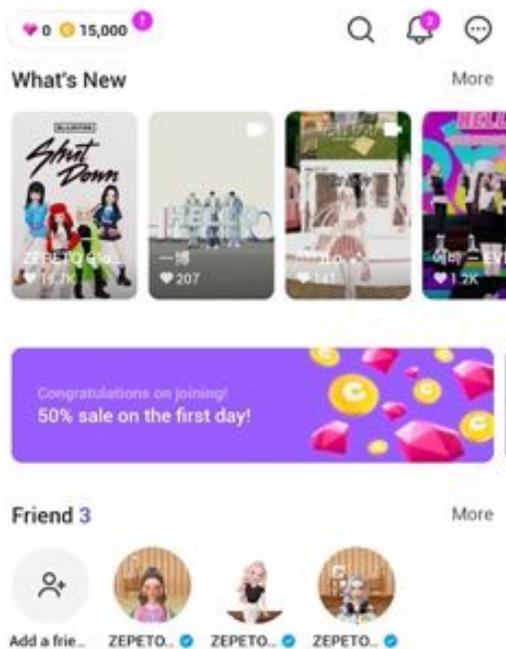
YouTube displays views and likes for each video, as well as the total number of subscribers to the channel.



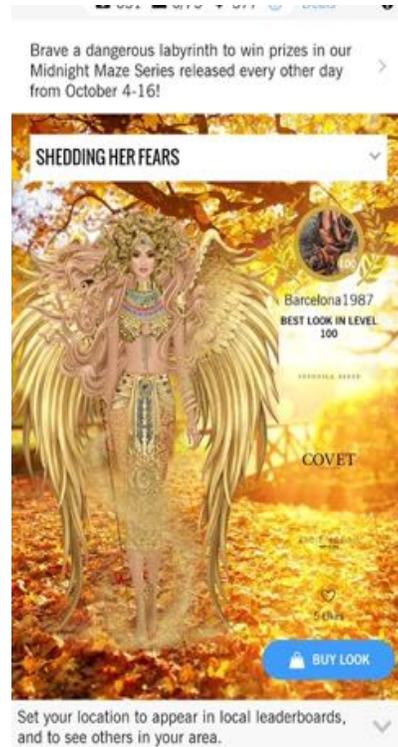
TikTok displays the total number of likes each user has received across all videos.



A user who wishes to avoid displaying like and view metrics for their Instagram posts must make that election on a post-by-post basis.



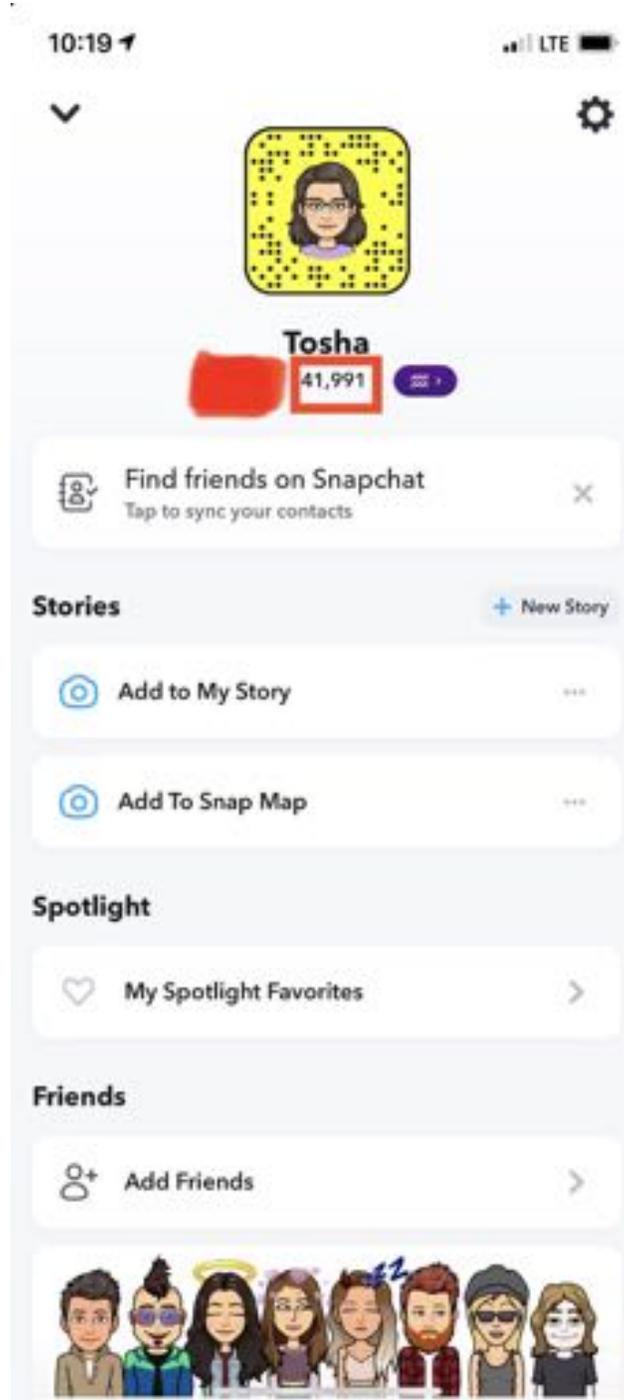
“Zepeto” from Naver Z Corporation makes visible the user’s number of friends as well as the number of followers on other accounts.



In “Covet Fashion” from Crowdstar, Inc., a dress-up app with a large teen user base, the homepage features top looks made by other players, displaying their usernames and the number of likes their outfit received.

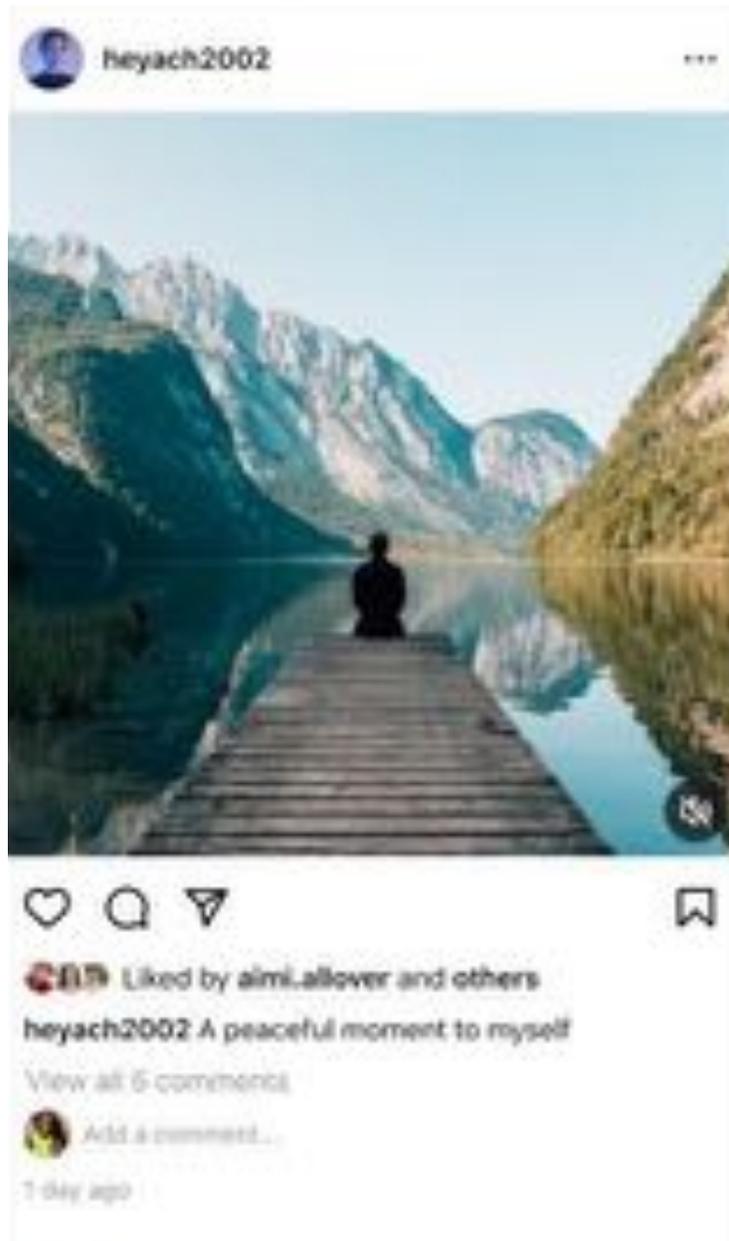


In “Hello Kitty World 2: Sanrio Kaw” from Access Bright, Japan Inc., when a user visits another user’s theme park, the top left corner displays the number of likes their theme park received. This user here is shown to have 3 likes.

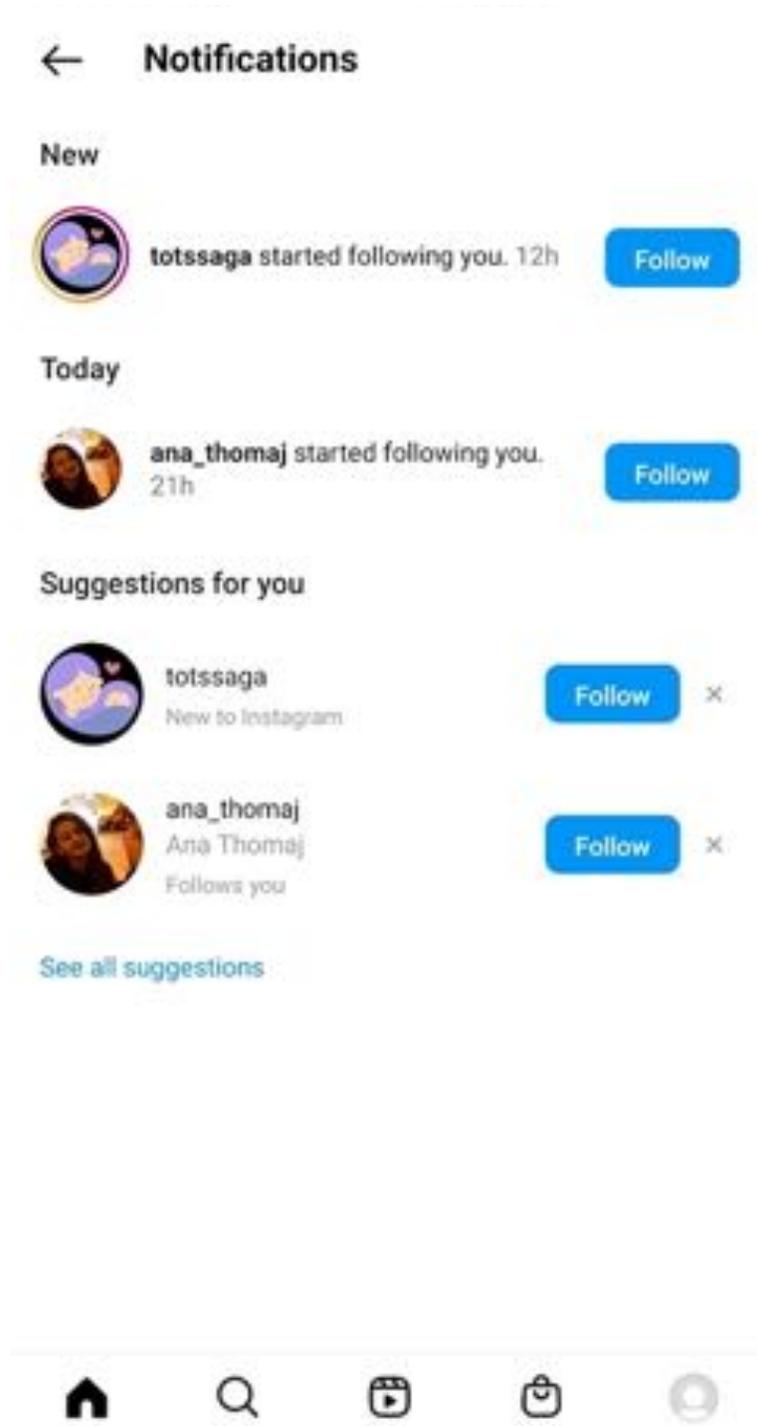


In Snapchat, a user's score is highlighted at the top of a summary of their profile. Users can also easily check friends' scores on their respective profiles.

2. Named Popularity



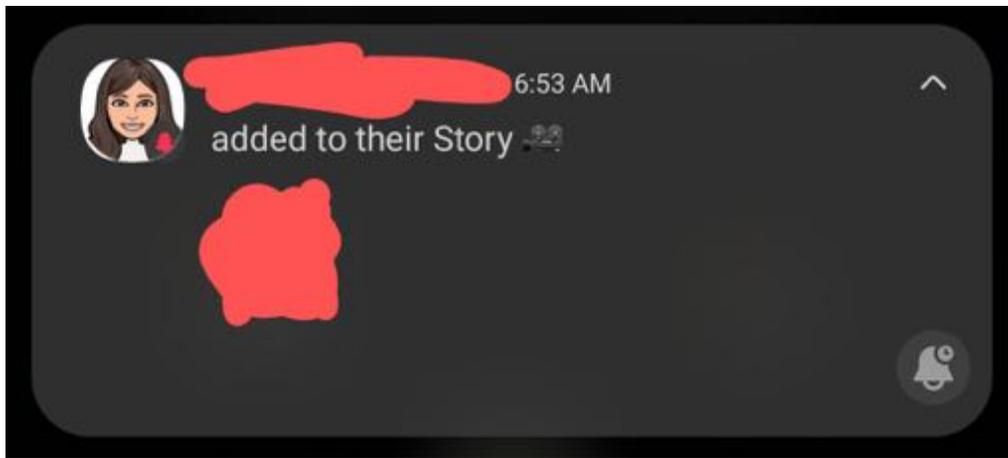
Instagram displays the usernames and profile pictures of specific users who have liked a piece of content. The first username displayed after the “liked by” on a post, in this case @aimi.allover, is not necessarily someone the user viewing the photo follows.



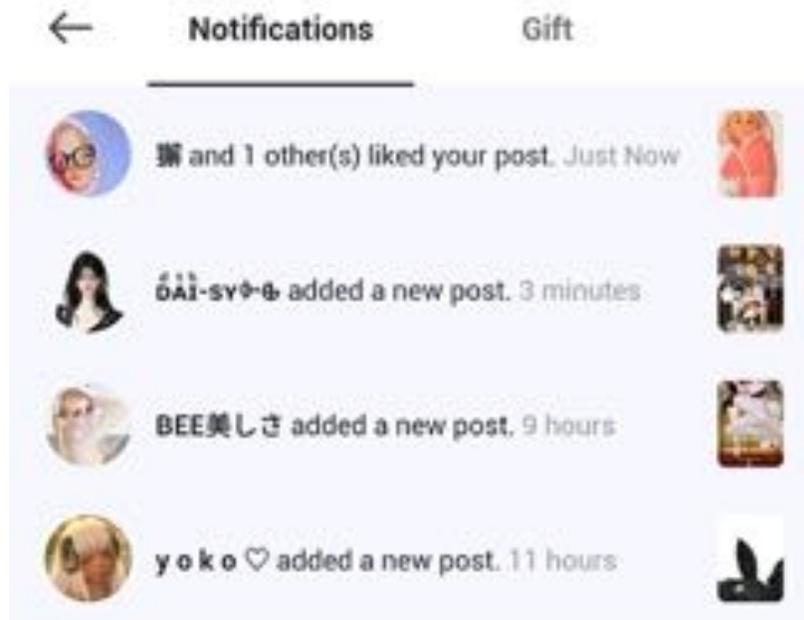
Instagram automatically sets account profile settings to “Public” for users who are minors, making their account able to be followed by users with whom they have never interacted. Users receive notifications about other users who have started following their account, displaying their username and profile picture.



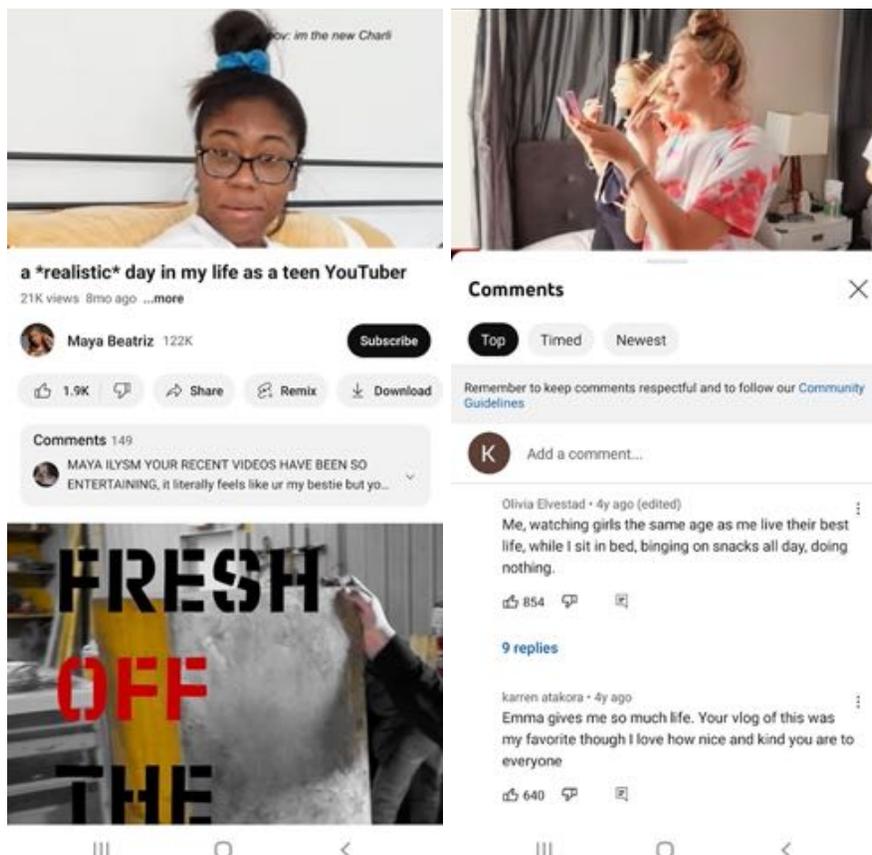
TikTok will have nudges for users to watch other popular videos. These nudges were made on an account registered as a 14-year old that was not following any other users.



After not engaging with the app for an unspecified period of time, Snapchat will sporadically notify users of their friends posting new content to their stories.

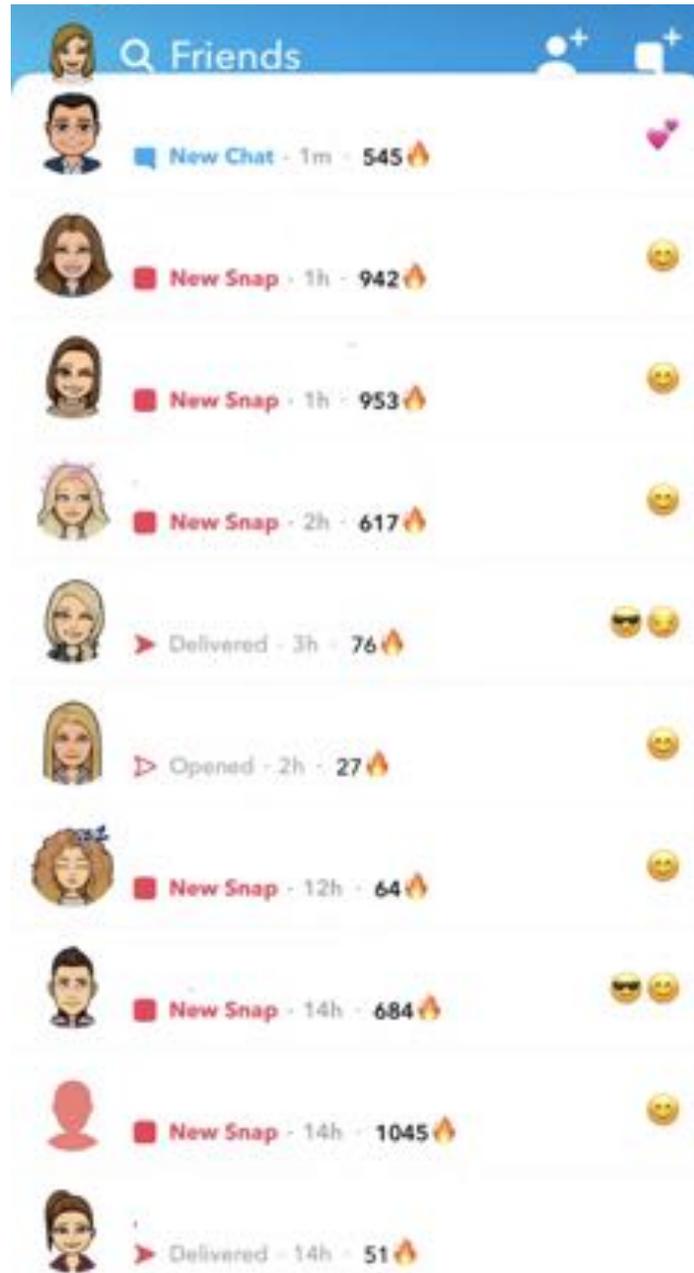


“Zepeto” from Naver Z Corporation displays the usernames and profile pictures of specific users who have interacted with a user’s post.



YouTube displays the usernames and profile pictures of users who comment on content posted by minors, as shown with these two videos posted by teenage video bloggers.

3. Interaction Streaks



In Snapchat, a number with a flame appears next to each friend's name, indicating the length (in days) of the user's Snapstreak with the friend.

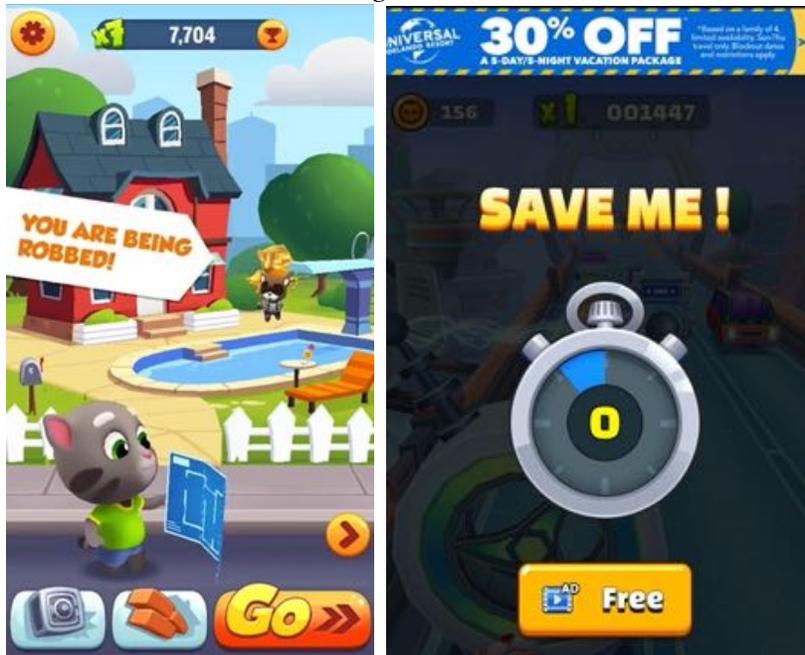
4. Parasocial Relationship Pressure.



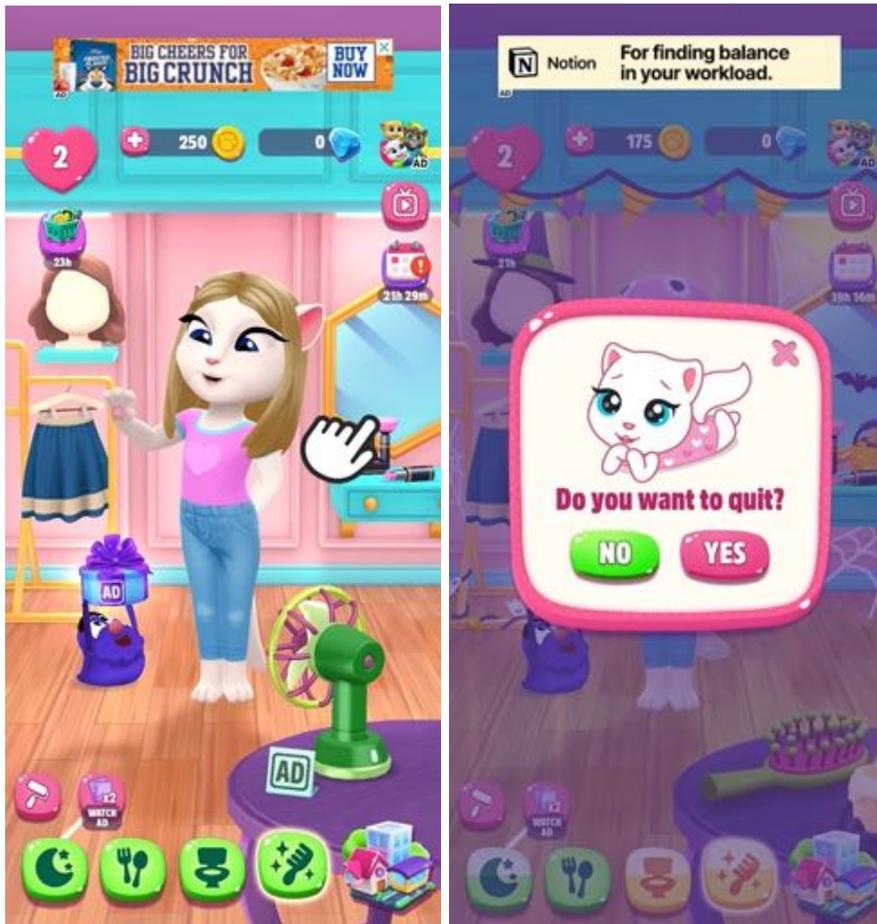
A character in a Roblox game accuses the player of lying to get the player to join a group, which gives the player access to other parts of the game like battling other groups. The player may have to send a personal message to join the group.



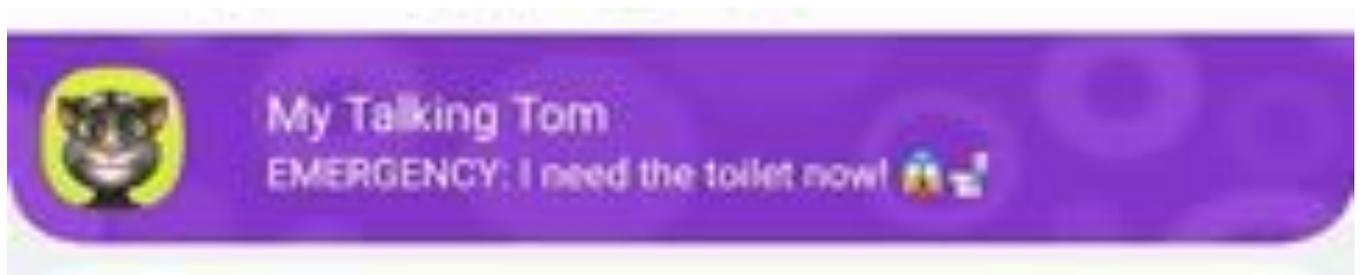
In an ad for the well-known game “Candy Crush Saga” from King, a character will drown if players are unsuccessful or choose to ignore the advertisement. Failing to save her causes a pop-up to appear with characters looking sad and a button for users to download and play the game.



In the popular game “Talking Tom Hero Dash” from Outfit7Limited, the player is led to believe that their cute cat character is being robbed, pressuring the player to play the game by pressing “Go”. When the cat character gets hit during gameplay, a countdown timer appears prompting the player to “SAVE” him by watching an advertisement.



In "My Talking Angela Two" from Outfit7 Limited, a smiling little purple character presents an interested Angela with a gift marked as "AD." These visuals manipulate players into clicking the present and watching an advertisement to have Angela receive the gift (left). Additionally, when the player attempts to exit the app, a pop-up with a sad-looking Angela appears asking if the player wants to quit, thus pressuring the player to remain on the game (right).



In “My Talking Tom” from Outfit7 Limited, when Tom goes to sleep, a dream cloud appears above his head with an advertisement. A child player would likely click on the advertisement simply out of desire to see what their virtual pet cat is dreaming about (top).

When the player has not taken Tom to the toilet after an extended period of time, a phone notification appears indicating an emergency (bottom). This pressures the player into opening the app to take Tom to the toilet.



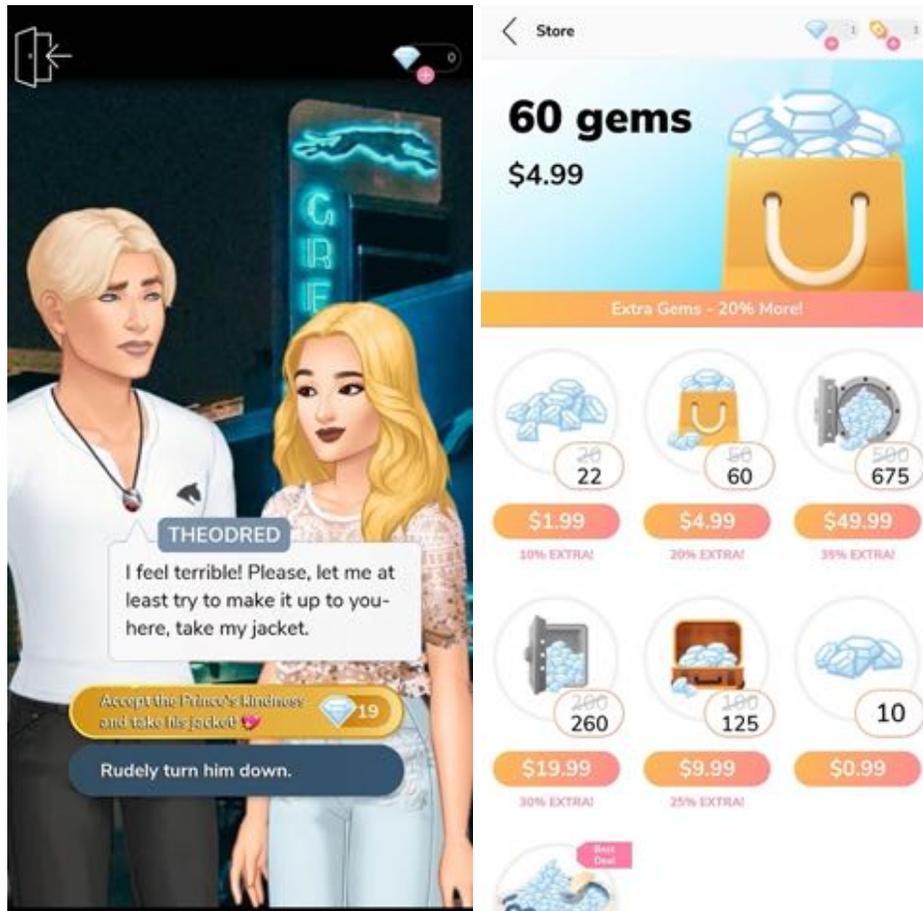
In “Dentist” from YovoGames, an advertisement is played after helping each animal patient. After the ad is finished, it pans to the waiting room with animals in pain incentivizing you to keep playing.



In “Sonic Forces” from Sega, in-game offers appear with the iconic video game characters Sonic and Knuckles in them encouraging users to pay for it, with an added timer at the bottom further pushing users to buy it now or lose the offer.



In "DragonCity" from Social Point, caged baby dragons appear with chat bubbles stating "Help..." When clicking the dragon, the user is asked if they want to save the crying dragon for a price of 50 diamonds—which would likely require an in-game purchase or extensive gameplay because diamonds are rarely awarded throughout the game (top and middle). When the user refuses to purchase a limited time in-game purchase offer, a pop-up asks the user if they are sure, featuring sad baby dragons and a shocked God character (bottom).



“Episode,” by Episode Interactive, a popular choose-your-adventure game among teens, requires diamonds for all game choices that significantly improve character relationships and story progression. Selecting such choices inevitably requires in-game purchases; each 12-episode story offers only 1 diamond per completed episode, and each episode has 3-4 scenes requiring 14-29 diamonds for a favorable option.

The single no-cost alternative the player can choose in a given scene is always framed negatively, even though it usually does not result in as severe of an outcome as its wording would suggest. This design feature thus manipulates the player into making in-game purchases by leveraging their desire for positive in-game relationships (especially with the main love interest).



In "Monster High: Beauty Shop" from CrazyLabs LTD, after the player photographs a completed look, the popular Monster High children's toy character Clawdeen Wolf pressures the user into creating another look.

A number of fake likes also appear on the image, which would reasonably create the false perception for the child user that they are gaining popularity among other people via gameplay.

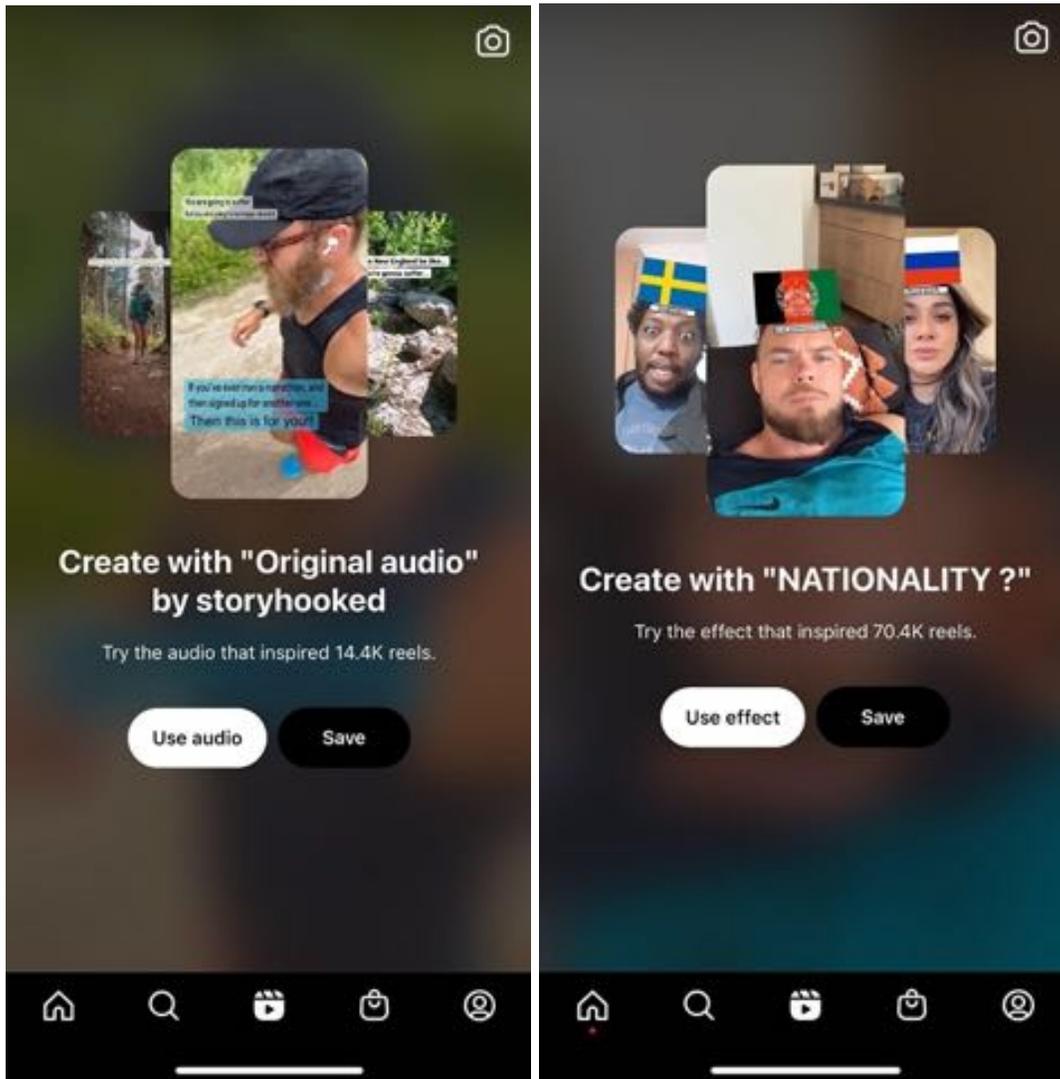


In “Squishy Magic” from Dramaton, orders appear like a text conversation with an in-game character, such as a cute bear with a crown seen above. Children could reasonably conceive of these characters and orders as real.

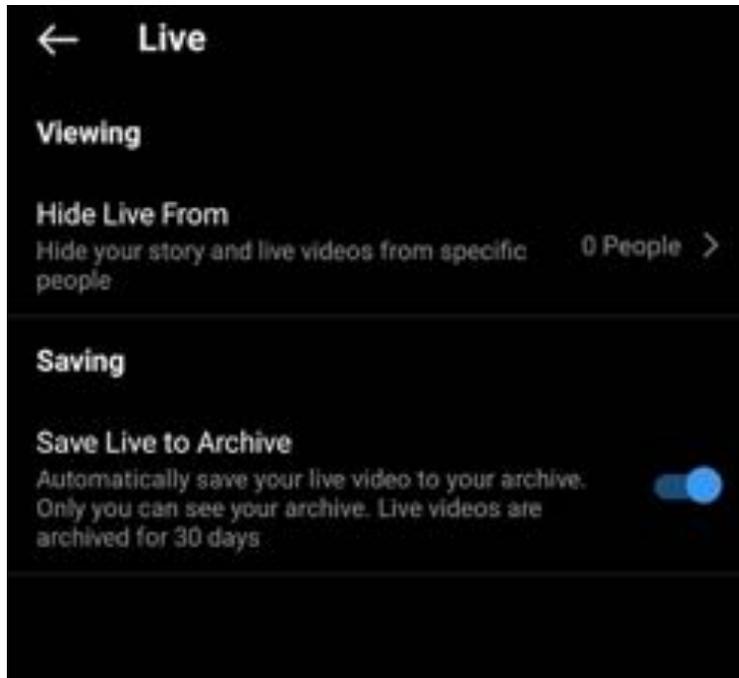


In “Candy Crush Saga” from King, choosing to quit a level presents you with a screen encouraging you to keep playing. If a player chooses to quit a level, a screen showing a broken heart and a character with a tear in the eye is displayed along with a “Retry” button.

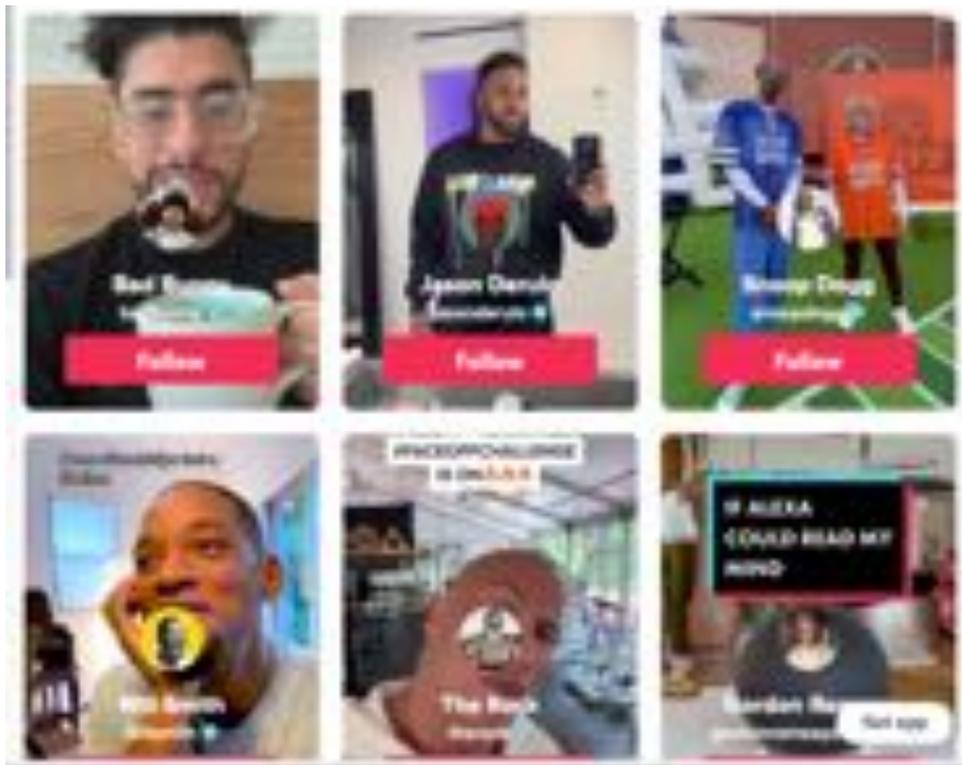
5. Incentivized Reach to Larger Audience



As a 14-year-old Instagram user scrolls through Reels on the app, they are prompted to create content using effects and audio that are popular among other users.



Instagram Live videos are available to everyone unless the user identifies specific individuals they wish to exclude. To block everyone, the user would have to make their account private.



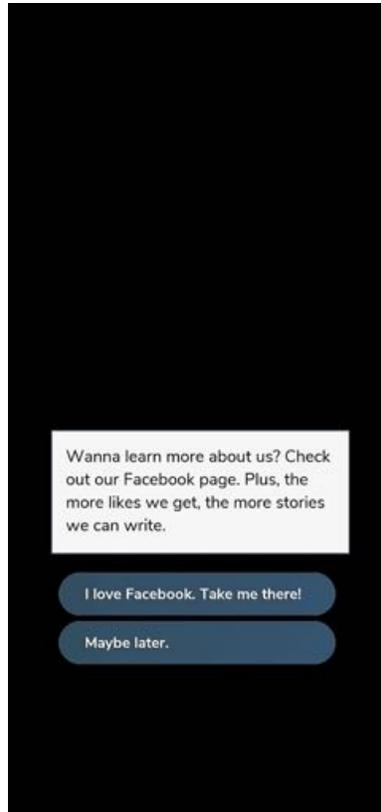
TikTok presents users with suggested accounts to follow.



Instagram displays "Suggested for You" profiles encouraging the user to follow other accounts.



In "Candy Crush Saga" from King, the game encourages users to invite friends in order to have more lives in the game.



In "Episode" from Episode Interactive, the user is randomly prompted to follow the app on the Episode Facebook page; they are incentivized to "like" it so that Episode may write more stories for users to enjoy.



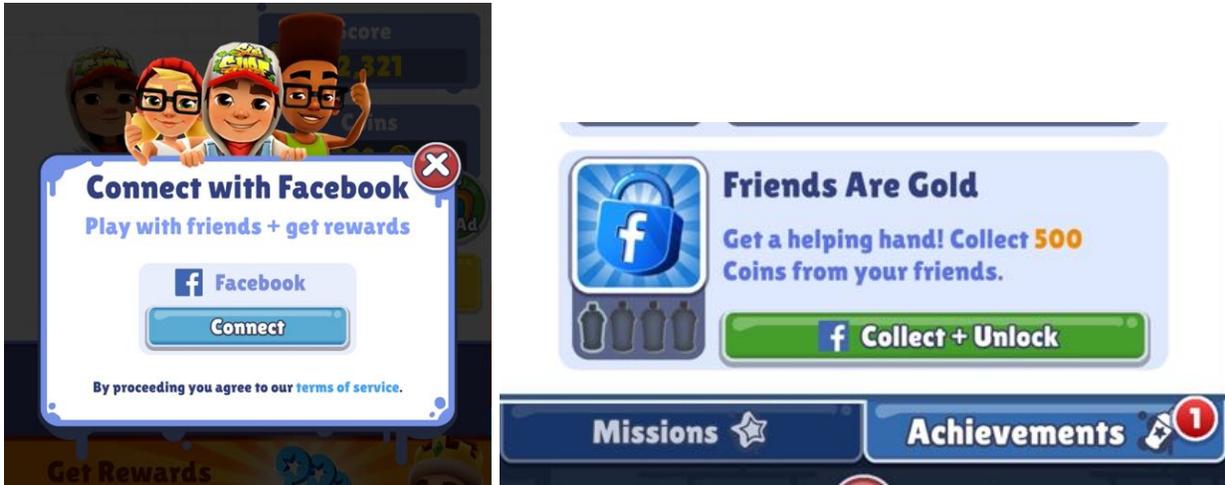
In "Lords Mobile" from I Got Games (IGG), players are encouraged to share the game with their Facebook friends daily to receive in-game rewards.



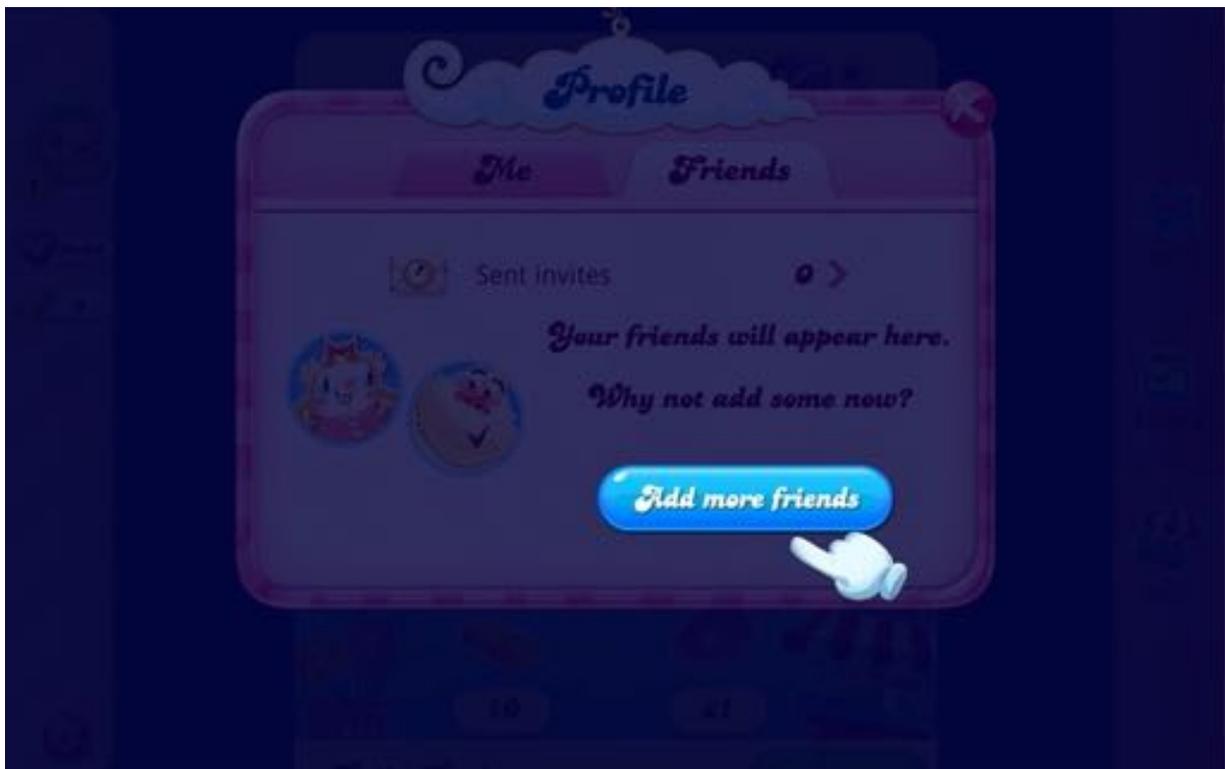
In "PK XD" Fun, Friends, and Games" from Afterverse Games, the user receives a pop-up to refer a friend to receive special rewards.



In "Best Fiends" from Seriously Digital Entertainment, signing into your Facebook account will grant you in-game items and allow you to share items with friends.



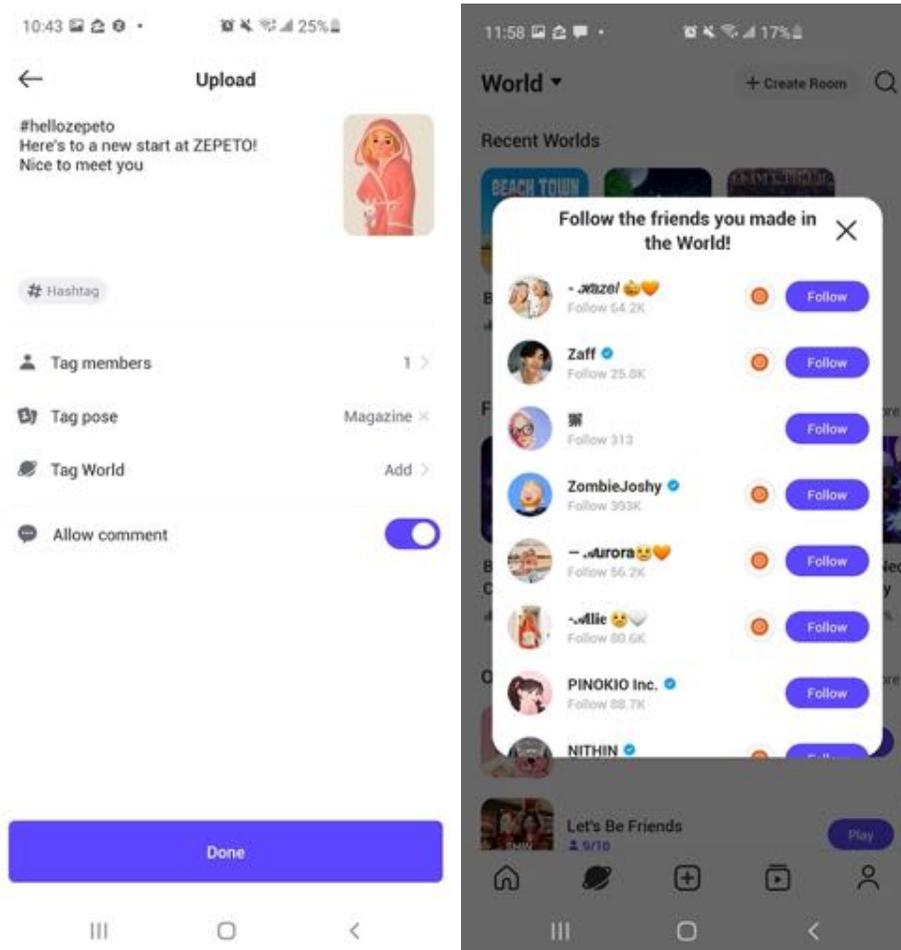
In "Subway Surfers" from SYBO Games, playing with friends from connecting your Facebook account allows for you to gain rewards in the game. Additionally, an achievement in the game is only unlockable by connecting your Facebook account.



In "Candy Crush Saga" from King, the game encourages players to add friends and forces them to press the "Add more friends" button as seen here in order to progress.



In “Chibi Island” by Nexters Global, the game encourages players to join the Chibi Island group on Facebook in order to gain in-game items.



In “Zepeto” from Naver Z Corporation the user is directed to take a picture of their avatar in the tutorial and upload it to their feed where “allow comments” is turned on by default (left).

When entering a world where the user can interact with other users, a pop-up appears prompting the user to follow other users who were present there—even when the user had not interacted with any of them (right).



“Homescapes” by Playrix displays an invitation to solve a crossword puzzle in the News tab of the game, which redirects the user to a Homescapes facebook post asking for users to their guesses in the comments, which are publicly viewable.