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Exhibit Y

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA**

PEOPLE OF THE STATE OF CALIFORNIA,
et al.,
Plaintiffs,

v.

META PLATFORMS, INC, Instagram, LLC,
Meta Payments, Inc., Meta Platforms
Technologies, LLC., et al.,
Defendants

IN RE: SOCIAL MEDIA ADOLESCENT
ADDICTION/PERSONAL INJURY
PRODUCTS LIABILITY LITIGATION

THIS DOCUMENT RELATES TO:
4:23-cv-05448

MDL No. 3047

Case No. 4:23-cv-05448-YGR

Judge: Hon. Yvonne Gonzalez Rogers

Magistrate Judge: Hon. Peter H. Kang

**TRIAL REPORT OF
Dr. Jean M. Twenge, Ph.D.
San Diego State University**

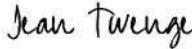
May 16, 2025

6. Conclusions

108. The totality of the evidence, including from time series, correlational, longitudinal, and experimental studies, demonstrates that social media use is a causal factor in the youth mental health crisis. Time series studies show that adolescent depression increased in tandem with smartphone and social media use, with no other explanation fitting the data. Correlational studies consistently show that the more hours an adolescent spends using social media, the more likely it is they are depressed or unhappy. Longitudinal studies with a time interval of a year or longer and with larger sample sizes find that increased social media use predicts worse adolescent mental health. Experimental studies show that reducing social media and screen use improves well-being. The evidence as a whole thus demonstrates a causal path from social media use to depression and low well-being, and fulfills all of the Bradford-Hill criteria for establishing causation.

109. The undersigned hereby certifies their understanding that they owe a primary and overriding duty of candor and professional integrity to help the Court on matters within their expertise and in all submissions to, or testimony before, the Court. The undersigned further certifies that their report and opinions are not being presented for any improper purpose, such as to harass, cause unnecessary delay, or needlessly increase the cost of litigation.

Date: 05/15/25 | 4:56 PM PDT

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Jean M. Twenge, Ph.D.

REFERENCES

- Allcott, H., Braghieri, L., Eichmeyer, S., & Gentzkow, M. (2020). The welfare effects of social media. *American Economic Review*, 110, 629–676.
- Blanchflower, D. (2024, June 17). Is the Gallup World Poll reliable? After Babel Substack. <https://www.afterbabel.com/p/gallup-world-poll>
- Boer, M., Cosma, A., Twenge, J. M., Inchley, J., Jericek Kalnscek, H., & Stevens, G. W. J. M. (2023). National-level schoolwork pressure, family structure, internet use, and obesity as drivers of time trends in adolescent psychological complaints between 2002 and 2018. *Journal of Youth and Adolescence*, 52, 2061–2077.
- Boers, E., Afzali, M. H., Newton, N., & Conrod, P. (2019). Association of Screen Time and Depression in Adolescence. *JAMA Pediatrics*, 173, 853–859.
- Braghieri, L., Levy, R., & Makarin, A. (2022). Social Media and Mental Health. *American Economic Review*, 112, 3660–3693.
- Burstein, B., Agostino, H., & Greenfield, B. (2019). Suicidal attempts and ideation among children and adolescents in US emergency departments, 2007–2015. *JAMA Pediatrics*, 173, 598–600.
- Cairns, R., Karanges, E. A., Wong, A., Brown, J. A., Robinson, J., Pearson, S.-A., Dawson, A. H., & Buckley, N. A. (2019). Trends in self-poisoning and psychotropic drug use in people aged 5–19 years: a population-based retrospective cohort study in Australia. *BMJ Open*, 9(2), e026001.
- Corredor-Waldron, A., & Currie, J. (2024). To what extent are trends in teen mental health driven by changes in reporting? The example of suicide-related hospital visits. *Journal of Human Resources*, 59, S14–S40.
- Coyne, S. M., Rogers, A. A., Zurcher, J. D., Stockdale, L., & Booth, M. (2020). Does time spent using social media impact mental health?: An eight year longitudinal study. *Computers in Human Behavior*, 104.
- Cybulski, L., Ashcroft, D. M., Carr, M. J., Garg, S., Chew-Graham, C. A., Kapur, N., & Webb, R. T. (2021). Temporal trends in annual incidence rates for psychiatric disorders and self-harm among children and adolescents in the UK, 2003–2018. *BMC Psychiatry*, 21, 1–12.
- Davis, C. G., & Goldfield, G. S. (2025). Limiting social media use decreases depression, anxiety, and fear of missing out in youth with emotional distress: A randomized controlled trial. *Psychology of Popular Media*.
- Deters, F. große, & Mehl, M. R. (2012). Does posting Facebook status updates increase or decrease loneliness? An online social networking experiment. *Social Psychological and Personality Science*, 4, 579–586.
- Faverio, M. & Sidoti, O. (2024, December 12). Teens, social media and technology 2024. Pew Research Center.

- Ferguson, C. J. (2024). Do social media experiments prove a link with mental health: A methodological and meta-analytic review. *Psychology of Popular Media*.
- Gajdics, J., & Jagodics, B. (2022). Mobile phones in schools: With or without you? Comparison of students' anxiety level and class engagement after regular and mobile-free school days. *Technology, Knowledge and Learning*, 27, 1095–1113.
- Gray, P., Lancy, D. F., & Bjorklund, D. F. (2023). Decline in independent activity as a cause of decline in children's mental well-being: Summary of the evidence. *Journal of Pediatrics*, 260, 113352.
- Gumas, E.D., & Baumgartner, J. C. (2023, June 22). *U.S. Overdose Deaths Remain Higher Than in Other Countries — How Harm Reduction Programs Could Help*. To the Point, Commonwealth Fund.
- Gutierrez, C. M., Prickett, K. C., Hollowell, C., Teiko, P., & Caton, L. (2022). Type of household firearm ownership and firearm suicide among adolescents, 1976–2018. *Preventive Medicine*, 165, 107244.
- Haidt, J. (2024). *The Anxious Generation*. New York: Penguin Press.
- Haidt, J., Twenge, J. M., & Rausch, Z. (2025). Social media and mental health: A collaborative review. Google doc. Accessed at: <https://docs.google.com/document/d/1w-HOfseF2wF9YIpXwUUtP65-olnkPyWcgF5BiAtBEy0>
- Heffer, T., Good, M., Daly, O., MacDonell, E., & Willoughby, T. (2019). The longitudinal association between social-media use and depressive symptoms among adolescents and young adults: An empirical reply to Twenge et al (2018). *Clinical Psychological Science*, 7, 462–470.
- Hisler, G., Twenge, J. M., & Krizan, Z. (2020). Associations between screen time and short sleep duration among adolescents varies by media type: Evidence from a cohort study. *Sleep Medicine*, 66, 92-102.
- Hill A. B. (1965). The Environment and disease: Association or causation? *Proceedings of the Royal Society of Medicine*, 58, 295–300.
- Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology*, 37, 751–768.
- Kannan, V. D., & Veazie, P. J. (2022). US trends in social isolation, social engagement, and companionship – nationally and by age, sex, race/ethnicity, family income, and work hours, 2003-2020. *SSM - Population Health*, 21, 101331.
- Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2019). Social Media Use and Adolescent Mental Health: Findings from the UK millennium cohort study. *EClinicalMedicine*, 6, 59–68.
- Keyes, K. M., Gary, D., O'Malley, P. M., Hamilton, A., & Schulenberg, J. (2019). Recent increases in depressive symptoms among US adolescents: Trends from 1991 to 2018. *Social Psychiatry and Psychiatric Epidemiology*, 54, 987–996.

- Klerman, G. L., & Weissman, M. M. (1989). Increasing rates of depression. *JAMA*, 261, 2229-2235.
- Krokstad, S., Weiss, D., Rangel, V., Kvaloy, K., Ingul, J., Twenge, J., & Sund, E. (2022). Divergent decennial trends in mental health according to age reveal poorer mental health for young people: Repeated cross-sectional population-based surveys from the HUNT Study, Norway. *BMJ Open*, 12, e057654.
- Kross, E., Verduyn, P., Demiral, E., Park, J., Lee, D. S., Lin, N., Shablack, H., Jonides, J., & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS ONE*, 8.
- Lenhart, A. (2015, April 9). Teens, social media, & technology overview 2015. Pew Research Center.
- Lepp, A., & Barkley, J. E. (2022). The experimental effect of social media use, treadmill walking, studying, and a control condition on positive and negative affect in college students. *Current Psychology*.
- Lewinsohn, P., Rohde, P., Seeley, J., & Fischer, S. (1993). Age-cohort changes in the lifetime occurrence of depression and other mental disorders. *Journal of Abnormal Psychology*, 102, 110-120.
- Liu, M., Kamper-DeMarco, K. E., Zhang, J., Xiao, J., Dong, D., & Xue, P. (2022). Time spent on social media and risk of depression in adolescents: A dose-response meta-analysis. *International Journal of Environmental Research and Public Health*, 19(9).
- Madden, M., Lenhart, A., & Duggan, M. (2013, March 13). Teens and technology 2013. Pew Research Center.
- Maza, M. T., Fox, K. A., Kwon, S.-J., Flannery, J. E., Lindquist, K. A., Prinstein, M. J., & Telzer, E. H. (2023). Association of habitual checking behaviors on social media with longitudinal functional brain development. *JAMA Pediatrics*, 177, 160–167.
- Meshi, D., Morawetz, C., & Heekeren, H. R. (2013). Nucleus accumbens response to gains in reputation for the self-relative to gains for others predicts social media use. *Frontiers in Human Neuroscience*, 7.
- Miech, R. A., Johnston, L. D., Patrick, M. E., & O'Malley, P. M. (2024). *Monitoring the Future: National survey results on drug use, 1975-2023: Overview and detailed results for secondary school students*. University of Michigan Institute for Social Research.
- Mitev, K., Weinstein, N., Karabeliova, S., Nguyen, T., Law, W., & Przybylski, A. (2021). Social media use only helps, and does not harm, daily interactions and well-being. *Technology, Mind, and Behavior*, 2.
- Mojtabai, R., Olfson, M., & Han, B. (2016). National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics*, 138(6).
- Newsom, C. R., Archer, R. P., Trumbetta, S., & Gottesman, I. I. (2003). Changes in adolescent response patterns on the MMPI/MMPI-A across four decades. *Journal of Personality Assessment*, 81, 74–84.

- Orben, A. (2020). Teenagers, screens and social media: A narrative review of reviews and key studies. *Social Psychiatry and Psychiatric Epidemiology*, 55, 407–414.
- Orben, A., & Przybylski, A. K. (2019). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, 3, 173–182.
- Orben, A., Przybylski, A. K., Blakemore, S.-J., & Kievit, R. A. (2022). Windows of developmental sensitivity to social media. *Nature Communications*, 13, 1649.
- Patalay, P., & Gage, S. H. (2019). Changes in millennial adolescent mental health and health-related behaviours over 10 years: A population cohort comparison study. *International Journal of Epidemiology*, 48, 1650-1664.
- Plemmons, G., Hall, M., Doupnik, S., Gay, J., Brown, C., Browning, W., Casey, R., Freundlich, K., Johnson, D. P., Lind, C., Rehm, K., Thomas, S., & Williams, D. (2018). Hospitalization for suicide ideation or attempt: 2008–2015. *Pediatrics*, 141, 1–10.
- Przybylski, A. K., Nguyen, T. T., Law, W., & Weinstein, N. (2021). Does taking a short break from social media have a positive effect on well-being? Evidence from three preregistered field experiments. *Journal of Technology in Behavioral Science*, 6, 507–514.
- Rausch, Z. (2024, January 3). The youth mental health crisis is international, unless you rely on a flawed international dataset (The GBD). After Babel Substack.
- Rausch, Z., & Haidt, J. (2024, September 10). The fundamental flaws of the only meta-analysis of social media reduction experiments (and why it matters), part 2. After Babel Substack.
- Reuben, A., Caspi, A., Belsky, D. W., Broadbent, J., Harrington, H., Sugden, K., Houts, R. M., Ramrakha, S., Poulton, R., & Moffitt, T. E. (2017). Association of childhood blood lead levels with cognitive function and socioeconomic status at age 38 years and with IQ change and socioeconomic mobility between childhood and adulthood. *JAMA*, 317, 1244–1251.
- Riehm, K. E., Feder, K. A., Tormohlen, K. N., Crum, R. M., Young, A. S., Green, K. M., Pacek, L. R., La Flair, L. N., & Mojtabai, R. (2019). Associations between time spent using social media and internalizing and externalizing problems among US youth. *JAMA Psychiatry*, 76, 1266–1273.
- Rodman, A. M., Powers, K. E., & Somerville, L. H. (2017). Development of self-protective biases in response to social evaluative feedback. *Proceedings of the National Academy of Sciences of the United States of America*, 114, 13158–13163.
- Rohrer, J. M. (2018). Thinking clearly about correlations and causation: Graphical causal models for observational data. *Advances in Methods and Practices in Psychological Science*, 1, 27–42.
- Rothwell, J. (2023, October 13). Teens spend average of 4.8 hours on social media per day. Gallup.
- Saiphoo, A. N., & Vahedi, Z. (2019). A meta-analytic review of the relationship between social media use and body image disturbance. *Computers in Human Behavior*, 101, 259–275.

- Schisterman, E. F., Cole, S. R., & Platt, R. W. (2009). Overadjustment bias and unnecessary adjustment in epidemiologic studies. *Epidemiology*, 20, 488–495.
- Schmidt-Persson, J., Rasmussen, M. G. B., Sorensen, S. O., Mortensen, S. R., Olesen, L. G., Brage, S., Kristensen, P. L., Bilenberg, N., & Grontved, A. (2024). Screen media use and mental health of children and adolescents: A secondary analysis of a randomized clinical trial. *JAMA Network Open*, 7, e2419881.
- Schrijvers, K., Cosma, A., Potrebny, T., Thorsteinsson, E., Catunda, C., Reiss, F., Hulbert, S., Kosticova, M., Melkumova, M., Bersia, M., Klanscek, H. J., Gaspar, T., & Dierckens, M. 2024 Three decades of adolescent health: Unveiling global trends across 41 countries in psychological and somatic complaints (1994–2022). *International Journal of Public Health*, 69, article1607774.
- Semken, C., & Rossell, D. (2022). Specification analysis for technology use and teenager well-being: Statistical validity and a Bayesian proposal. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, 71, 1330–1355.
- Spiller, H. A., Ackerman, J. P., Spiller, N. E., & Casavant, M. J. (2019). Sex- and age-specific increases in suicide attempts by self-poisoning in the United States among youth and young adults from 2000 to 2018. *Journal of Pediatrics*, 210, 201–208.
- Stein, D. (2024, October 4). The fundamental flaws of the only meta-analysis of social media reduction experiments (and why it matters), Part 3. After Babel Substack.
- Swanson, S.A., Eyllon, M., Sheu, Y.H., Miller, M. (2021). Firearm access and adolescent suicide risk: Toward a clearer understanding of effect size. *Injury Prevention*, 27, 264–270.
- Thrul, J., Devkota, J., AlJuboori, D., Regan, T., Alomairah, S., & Vidal, C. (2025). Social media reduction or abstinence interventions are providing mental health benefits – reanalysis of a published meta-analysis. *Psychological of Popular Media*.
- Twenge, J. M. (2000). The age of anxiety? Birth cohort change in anxiety and neuroticism, 1952–1993. *Journal of Personality and Social Psychology*, 79, 1007–1021.
- Twenge, J. M. (2015). Time period and birth cohort differences in depressive symptoms in the U.S., 1982–2013. *Social Indicators Research*, 121, 437–454.
- Twenge, J. M. (2023a, March 15). Academic pressure cannot explain the mental illness epidemic. After Babel Substack.
- Twenge, J. M. (2023b, October 18). Here are 13 other explanations for the adolescent mental health crisis. None of them work. Generation Tech Substack.
- Twenge, J. M. (2024a, April 30). This group is more likely to be depressed and think about suicide. Generation Tech Substack.
- Twenge, J. M. (2024b, May 29). Parent drug overdoses: The true cause of the adolescent mental health crisis? Generation Tech Substack.
- Twenge, J. M. (2024c, June 12). Have some teens benefited in the era of social media? Generation Tech Substack.

- Twenge, J. M. (2024d, December 12). The homework bubble has popped. *Generation Tech Substack*.
- Twenge, J. M. (2024e, May 2024). Changes in parents' mental health did not drive the adolescent mental health crisis. *After Babel Substack*.
- Twenge, J. M. (2025a). *Generations: The Real Differences between Gen Z, Millennials, Gen X, Boomers and Silents—and What They Mean for America's Future*. Updated paperback edition. New York: Atria Books.
- Twenge, J. M. (2025b, January 9). The pandemic was bad for teen mental health. The smartphone and social media were worse. *Generation Tech Substack*.
- Twenge, J. M. (2025c, February 11). For teens, the loneliness epidemic is not a myth. *Generation Tech Substack*.
- Twenge, J. M., & Farley, E. (2020). Not all screen time is created equal: Associations with mental health vary by activity and gender. *Social Psychiatry and Psychiatric Epidemiology*, 56, 207-217.
- Twenge, J.M., Haidt, J., Joiner, T., Campbell, W.K. (2020). Underestimating digital media harm. *Nature Human Behaviour*, 4, 346-348.
- Twenge, J. M., Haidt, J., Blake, A. B., McAllister, C., Lemon, H., & LeRoy, A. (2021). Worldwide increases in adolescent loneliness. *Journal of Adolescence*, 93, 257-269.
- Twenge, J. M., Haidt, J., Lozano, J., & Cummins, K. M. (2022). Specification curve analysis shows that social media use is linked to poor mental health, especially among girls. *Acta Psychologica*, 224, 103512.
- Twenge, J. M., & Hamilton, J. L. (2022). Linear correlation is insufficient as the sole measure of associations: The case of technology use and mental health. *Acta Psychologica*, 229, e103696.
- Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2018a). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among U.S. adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science*, 6, 3-17.
- Twenge, J. M., Krizan, Z., & Hisler, G. (2017). Decreases in self-reported sleep duration among U.S. adolescents 2009-2015 and links to new media screen time. *Sleep Medicine*, 39, 47-53.
- Twenge, J. M., Martin, G. N., & Campbell, W. K. (2018b). Decreases in psychological well-being among American adolescents after 2012 and links to screen time during the rise of smartphone technology. *Emotion*, 18, 765-780.
- Twenge, J. M., & Martin, G. N. (2020). Gender differences in associations between digital media use and psychological well-being: Evidence from three large datasets. *Journal of Adolescence*, 79, 91-102.
- Twenge, J. M., Cooper, A. B., Joiner, T. E., Duffy, M. E., & Binau, S. G. (2019a). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a

- nationally representative dataset, 2005-2017. *Journal of Abnormal Psychology*, 128, 185-199.
- Twenge, J. M., Martin, G. N., & Spitzberg, B. H. (2019b). Trends in U.S. adolescents' media use, 1976-2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychology of Popular Media Culture*, 8, 329-345.
- Twenge, J. M., Spitzberg, B. H., & Campbell, W. K. (2019c). Less in-person social interaction with peers among U.S. adolescents in the 21st century and links to loneliness. *Journal of Social and Personal Relationships*, 36, 1892-1913.
- Twenge, J. M., & Park, H. (2019). The decline in adult activities among U.S. adolescents, 1976-2016. *Child Development*, 90, 638-654.
- Van der Wal, A., Beyens, I., Janssen, L. H. C., & Valkenburg, P. M. (2025). Social media use leads to negative mental health outcomes for most adolescents. Preprint manuscript, PsyArXiv.
- Vázquez-Vázquez, A., Smith, A., Gibson, F., Roberts, H., Mathews, G., Ward, J. L., Viner, R. M., Nicholls, D., Cornaglia, F., Roland, D., Phillips, K., & Hudson, L. D. (2024).
- Admissions to paediatric medical wards with a primary mental health diagnosis: a systematic review of the literature. *Archives of Disease in Childhood*, 109, 707-716.
- Verduyn, P., Lee, D. S., Park, J., Shablack, H., Orvell, A., Bayer, J., Ybarra, O., Jonides, J., & Kross, E. (2015). Passive Facebook usage undermines affective well-being: Experimental and longitudinal evidence. *Journal of Experimental Psychology: General*, 144, 480-488.
- Viner, R. M., Gireesh, A., Stiglic, N., Hudson, L. D., Goddings, A.-L., Ward, J. L., & Nicholls, D. E. (2019). Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data. *The Lancet Child & Adolescent Health*, 3, 685-696.
- Vuorre, M., & Przybylski, A. K. (2023). Estimating the association between Facebook adoption and well-being in 72 countries. *Royal Society Open Science*, 10, 221451.
- Vuorre, M., & Przybylski, A. K. (2024a). Global well-being and mental health in the Internet age. *Clinical Psychological Science*, 12, 917-935.
- Vuorre, M., & Przybylski, A. K. (2024b). A multiverse analysis of the associations between internet use and well-being. *Technology, Mind, and Behavior*, 5.
- Ward, J. L., Vázquez-Vázquez, A., Phillips, K., Settle, K., Pilvar, H., Cornaglia, F., Gibson, F., Nicholls, D., Roland, D., Mathews, G., Roberts, H., Viner, R. M., & Hudson, L. D. (2025). Admission to acute medical wards for mental health concerns among children and young people in England from 2012 to 2022: A cohort study. *The Lancet Child & Adolescent Health*, 9, 112-120.
- Wells, G., Horowitz, J., & Seetharaman, D. (2021, September 14). Facebook knows Instagram is toxic for teen girls, company documents show. *Wall Street Journal*.

- Zhao, Y., Paulus, M., Bagot, K. S., Constable, R. T., Yaggi, H. K., Redeker, N. S., & Potenza, M. N. (2022). Brain structural covariation linked to screen media activity and externalizing behaviors in children. *Journal of Behavioral Addictions*, *11*, 417–426.
- Zhao, Y., Paulus, M. P., & Potenza, M. N. (2023). Brain structural co-development is associated with internalizing symptoms two years later in the ABCD cohort. *Journal of Behavioral Addictions*, *12*, 80–93.