

Included Studies

1. Abrami, P., Borohkovski, E. & Lysenko, L. The effects of ABRACADABRA on reading outcomes: A meta-analysis of applied field research. *Journal of Interactive Learning Research* **26**, 337–367 (2015).
2. Abrami, P. C., Lysenko, L. & Borokhovski, E. The effects of ABRACADABRA on reading outcomes: An updated meta-analysis and landscape review of applied field research. *Journal of Computer Assisted Learning* **36**, 260–279 (2020).
3. Adelantado-Renau, M. *et al.* Association Between Screen Media Use and Academic Performance Among Children and Adolescents: A Systematic Review and Meta-analysis. *JAMA Pediatrics* **173**, 1058 (2019).
4. Aghasi, M., Matinfar, A., Golzarand, M., Salari-Moghaddam, A. & Ebrahimpour-Koujan, S. Internet Use in Relation to Overweight and Obesity: A Systematic Review and Meta-Analysis of Cross-Sectional Studies. *Advances in Nutrition* **11**, 349–356 (2019).
5. Alimoradi, Z. *et al.* Internet addiction and sleep problems: A systematic review and meta-analysis. *Sleep Medicine Reviews* **47**, 51–61 (2019).
6. Ameryoun, A., Sanaeinasab, H., Saffari, M. & Koenig, H. G. Impact of Game-Based Health Promotion Programs on Body Mass Index in Overweight/Obese Children and Adolescents: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Childhood Obesity* **14**, 67–80 (2018).
7. Anderson, C. A. *et al.* Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin* **136**, 151–173 (2010).
8. Andrade, A., Correia, C. K. & Coimbra, D. R. The Psychological Effects of Exergames for Children and Adolescents with Obesity: A Systematic Review and Meta-Analysis. *Cyberpsychology, Behavior, and Social Networking* **22**, 724–735 (2019).
9. Arztmann, M., Hornstra, L., Jeuring, J. & Kester, L. Effects of games in STEM education: A meta-analysis on the moderating role of student background characteristics. *Studies in Science Education* **59**, 109–145 (2022).
10. Aspiranti, K. B., Larwin, K. H. & Schade, B. P. iPads/tablets and students with autism: A meta-analysis of academic effects. *Assistive Technology* **32**, 23–30 (2020).
11. Baradaran Mahdavi, S., Riahi, R., Vahdatpour, B. & Kelishadi, R. Association between sedentary behavior and low back pain; A systematic review and meta-analysis. *Health Promotion Perspectives* **11**, 393–410 (2021).
12. Barnett, A., Cerin, E. & Baranowski, T. Active Video Games for Youth: A Systematic Review. *Journal of Physical Activity and Health* **8**, 724–737 (2011).
13. Bartel, K. A., Gradisar, M. & Williamson, P. Protective and risk factors for adolescent sleep: A meta-analytic review. *Sleep Medicine Reviews* **21**, 72–85 (2015).
14. Beck Silva, K. B., Miranda Pereira, E., Santana, M. L. P. de, Costa, P. R. F. & Silva, R. de C. R. Effects of computer-based interventions on food consumption and anthropometric parameters of adolescents: A systematic review and metanalysis. *Critical Reviews in Food Science and Nutrition* 1–13 (2022) doi:10.1080/10408398.2022.2118227.
15. Benavides-Varela, S. *et al.* Effectiveness of digital-based interventions for children with mathematical learning difficulties: A meta-analysis. *Computers & Education* **157**, 103953 (2020).

16. Beneria, A. *et al.* Online interventions for cannabis use among adolescents and young adults: Systematic review and meta-analysis. *Early Intervention in Psychiatry* **16**, 821–844 (2022).
17. Blok, H., Oostdam, R., Otter, M. E. & Overmaat, M. Computer-assisted instruction in support of beginning reading instruction: A review. *Review of educational research* **72**, 101–130 (2002).
18. Bochner, R. E., Sorensen, K. M. & Belamarich, P. F. The Impact of Active Video Gaming on Weight in Youth: A Meta-Analysis. *Clinical Pediatrics* **54**, 620–628 (2015).
19. Bossen, D. *et al.* Effectiveness of Serious Games to Increase Physical Activity in Children With a Chronic Disease: Systematic Review With Meta-Analysis. *Journal of Medical Internet Research* **22**, e14549 (2020).
20. Boyland, E. J. *et al.* Advertising as a cue to consume: A systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *American Journal of Clinical Nutrition* **103**, 519–533 (2016).
21. Boyland, E. *et al.* Association of Food and Nonalcoholic Beverage Marketing With Children and Adolescents' Eating Behaviors and Health: A Systematic Review and Meta-analysis. *JAMA Pediatrics* **176**, e221037 (2022).
22. Burkhardt, J. & Lenhard, W. A Meta-Analysis on the Longitudinal, Age-Dependent Effects of Violent Video Games on Aggression. *Media Psychology* **25**, 499–512 (2022).
23. Byun, J. & Joung, E. Digital game-based learning for K-12 mathematics education: A meta-analysis. *School Science and Mathematics* **118**, 113–126 (2018).
24. Cai, Y., Pan, Z. & Liu, M. Augmented reality technology in language learning: A meta-analysis. *Journal of Computer Assisted Learning* **38**, 929–945 (2022).
25. Cao, Y., Huang, T., Huang, J., Xie, X. & Wang, Y. Effects and Moderators of Computer-Based Training on Children's Executive Functions: A Systematic Review and Meta-Analysis. *Frontiers in Psychology* **11**, 580329 (2020).
26. Cao, X. *et al.* Risk of Accidents or Chronic Disorders From Improper Use of Mobile Phones: A Systematic Review and Meta-analysis. *Journal of Medical Internet Research* **24**, e21313 (2022).
27. Casale, S. *et al.* A meta-analysis on the association between self-esteem and problematic smartphone use. *Computers in Human Behavior* **134**, 107302 (2022).
28. Champion, K. E. *et al.* Effectiveness of school-based eHealth interventions to prevent multiple lifestyle risk behaviours among adolescents: A systematic review and meta-analysis. *The Lancet Digital Health* **1**, e206–e221 (2019).
29. Chan, K. K. & Leung, S. W. Dynamic Geometry Software Improves Mathematical Achievement: Systematic Review and Meta-Analysis. *Journal of Educational Computing Research* **51**, 311–325 (2014).
30. Chan, G. *et al.* The impact of eSports and online video gaming on lifestyle behaviours in youth: A systematic review. *Computers in Human Behavior* **126**, 106974 (2022).
31. Chen, C.-H., Shih, C.-C. & Law, V. The Effects of Competition in Digital Game-Based Learning (DGBL): A Meta-Analysis. *Educational Technology Research and Development* **68**, 1855–1873 (2020).
32. Chen, L., Ho, S. S. & Lwin, M. O. A meta-analysis of factors predicting cyberbullying perpetration and victimization: From the social cognitive and media effects approach. *New Media & Society* **19**, 1194–1213 (2017).

33. Cheung, A. C. K. & Slavin, R. E. The effectiveness of educational technology applications for enhancing mathematics achievement in K-12 classrooms: A meta-analysis. *Educational Research Review* **9**, 88–113 (2013).
34. Cheung, A. C. K. & Slavin, R. E. Effects of Educational Technology Applications on Reading Outcomes for Struggling Readers: A Best-Evidence Synthesis. *Reading Research Quarterly* **48**, 277–299 (2013).
35. Cheung, A. C. K. & Slavin, R. E. How features of educational technology applications affect student reading outcomes: A meta-analysis. *Educational Research Review* **7**, 198–215 (2012).
36. Chodura, S., Kuhn, J.-T. & Holling, H. Interventions for Children With Mathematical Difficulties: A Meta-Analysis. *Zeitschrift für Psychologie* **223**, 129–144 (2015).
37. Cho, K., Lee, S., Joo, M.-H. & Becker, B. The Effects of Using Mobile Devices on Student Achievement in Language Learning: A Meta-Analysis. *Education Sciences* **8**, 105 (2018).
38. Claussen, A. H. *et al.* All in the Family? A Systematic Review and Meta-analysis of Parenting and Family Environment as Risk Factors for Attention-Deficit/Hyperactivity Disorder (ADHD) in Children. *Prevention Science* (2022) doi:10.1007/s11121-022-01358-4.
39. Clinton, V. Reading from paper compared to screens: A systematic review and meta-analysis. *Journal of Research in Reading* **42**, 288–325 (2019).
40. Comeras-Chueca, C. *et al.* The Effects of Active Video Games on Health-Related Physical Fitness and Motor Competence in Children and Adolescents with Healthy Weight: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health* **18**, 6965 (2021).
41. Comeras-Chueca, C. *et al.* Effects of Active Video Games on Health-Related Physical Fitness and Motor Competence in Children and Adolescents With Overweight or Obesity: Systematic Review and Meta-Analysis. *JMIR Serious Games* **9**, e29981 (2021).
42. Cox, R., Skouteris, H., Rutherford, L. & Fuller-Tyszkiewicz, M. The Association between Television Viewing and Preschool Child Body Mass Index: A systematic review of English papers published from 1995 to 2010. *Journal of Children and Media* **6**, 198–220 (2012).
43. Coyne, S. M. *et al.* A meta-analysis of prosocial media on prosocial behavior, aggression, and empathic concern: A multidimensional approach. *Developmental Psychology* **54**, 331–347 (2018).
44. Cunningham, S., Hudson, C. C. & Harkness, K. Social Media and Depression Symptoms: A Meta-Analysis. *Research on Child and Adolescent Psychopathology* **49**, 241–253 (2021).
45. Cushing, C. C. & Steele, R. G. A Meta-Analytic Review of eHealth Interventions for Pediatric Health Promoting and Maintaining Behaviors. *Journal of Pediatric Psychology* **35**, 937–949 (2010).
46. Darling, K. E. & Sato, A. F. Systematic Review and Meta-Analysis Examining the Effectiveness of Mobile Health Technologies in Using Self-Monitoring for Pediatric Weight Management. *Childhood Obesity* **13**, 347–355 (2017).
47. Davey, S. & Davey, A. Assessment of Smartphone Addiction in Indian Adolescents: A Mixed Method Study by Systematic-review and Meta-analysis Approach. *International Journal of Preventive Medicine* **5**, 1500–1511 (2014).
48. David, O. A., Costescu, C., Cardos, R. & Mogoase, C. How Effective are Serious Games for Promoting Mental Health and Health Behavioral Change in Children and Adolescents? A Systematic Review and Meta-analysis. *Child & Youth Care Forum* **49**, 817–838 (2020).

49. de Ribera, O. S., Trajtenberg, N., Shenderovich, Y. & Murray, J. Correlates of youth violence in low- and middle-income countries: A meta-analysis. *Aggression and Violent Behavior* **49**, 101306 (2019).
50. Di, X. & Zheng, X. A meta-analysis of the impact of virtual technologies on students' spatial ability. *Educational technology research and development* **70**, 73–98 (2022).
51. Eirich, R. *et al.* Association of Screen Time With Internalizing and Externalizing Behavior Problems in Children 12 Years or Younger: A Systematic Review and Meta-analysis. *JAMA Psychiatry* **79**, 393 (2022).
52. Erçelik, Z. E. & Çağlar, S. Effectiveness of active video games in overweight and obese adolescents: A systematic review and meta-analysis of randomized controlled trials. *Annals of Pediatric Endocrinology & Metabolism* **27**, 98–104 (2022).
53. Fang, K., Mu, M., Liu, K. & He, Y. Screen time and childhood overweight/obesity: A systematic review and meta-analysis. *Child: Care, Health and Development* **45**, 744–753 (2019).
54. Fedele, D. A., Cushing, C. C., Fritz, A., Amaro, C. M. & Ortega, A. Mobile Health Interventions for Improving Health Outcomes in Youth: A Meta-analysis. *JAMA Pediatrics* **171**, 461 (2017).
55. Feng, J., Zheng, C., Sit, C. H.-P., Reilly, J. J. & Huang, W. Y. Associations between meeting 24-hour movement guidelines and health in the early years: A systematic review and meta-analysis. *Journal of Sports Sciences* **39**, 2545–2557 (2021).
56. Ferguson, C. J. 13 Reasons Why Not: A Methodological and Meta-Analytic Review of Evidence Regarding Suicide Contagion by Fictional Media. *Suicide and Life-Threatening Behavior* **49**, 1178–1186 (2019).
57. Ferguson, C. J. Do Angry Birds Make for Angry Children? A Meta-Analysis of Video Game Influences on Children's and Adolescents' Aggression, Mental Health, Prosocial Behavior, and Academic Performance. *Perspectives on Psychological Science* **10**, 646–666 (2015).
58. Ferguson, C. J., Nielsen, R. K. L. & Markey, P. M. Does Sexy Media Promote Teen Sex? A Meta-Analytic and Methodological Review. *Psychiatric Quarterly* **88**, 349–358 (2017).
59. Ferguson, C. J. & Kilburn, J. The Public Health Risks of Media Violence: A Meta-Analytic Review. *The Journal of Pediatrics* **154**, 759–763 (2009).
60. Ferguson, C. J., Copenhaver, A. & Markey, P. Reexamining the Findings of the American Psychological Association's 2015 Task Force on Violent Media: A Meta-Analysis. *Perspectives on Psychological Science* **15**, 1423–1443 (2020).
61. Ferguson, C. J. *et al.* Like this meta-analysis: Screen media and mental health. *Professional Psychology: Research and Practice* **53**, 205–214 (2022).
62. Fischer, P., Greitemeyer, T., Kastenmüller, A., Vogrincic, C. & Sauer, A. The effects of risk-glorifying media exposure on risk-positive cognitions, emotions, and behaviors: A meta-analytic review. *Psychological Bulletin* **137**, 367–390 (2011).
63. Folkvord, F. & van 't Riet, J. The persuasive effect of advergames promoting unhealthy foods among children: A meta-analysis. *Appetite* **129**, 245–251 (2018).
64. Foreman, J. *et al.* Association between digital smart device use and myopia: A systematic review and meta-analysis. *The Lancet Digital Health* **3**, e806–e818 (2021).

65. Fowler, L. A. *et al.* Harnessing technological solutions for childhood obesity prevention and treatment: A systematic review and meta-analysis of current applications. *International Journal of Obesity* **45**, 957–981 (2021).
66. Furenes, M. I., Kucirkova, N. & Bus, A. G. A Comparison of Children’s Reading on Paper versus Screen: A Meta-Analysis. *Review of Educational Research* **91**, 483–517 (2021).
67. Gao, Z., Chen, S., Pasco, D. & Pope, Z. A meta-analysis of active video games on health outcomes among children and adolescents: A meta-analysis of active video games. *Obesity Reviews* **16**, 783–794 (2015).
68. Gardella, J. H., Fisher, B. W. & Teurbe-Tolon, A. R. A Systematic Review and Meta-Analysis of Cyber-Victimization and Educational Outcomes for Adolescents. *Review of Educational Research* **87**, 283–308 (2017).
69. Garzón, J. & Acevedo, J. Meta-analysis of the impact of Augmented Reality on students’ learning gains. *Educational Research Review* **27**, 244–260 (2019).
70. Garzón, J., Pavón, J. & Baldiris, S. Systematic review and meta-analysis of augmented reality in educational settings. *Virtual Reality* **23**, 447–459 (2019).
71. Ghobadi, S. *et al.* Association of eating while television viewing and overweight/obesity among children and adolescents: A systematic review and meta-analysis of observational studies: Television viewing, overweight, obesity, children. *Obesity Reviews* **19**, 313–320 (2018).
72. Grabe, S., Ward, L. M. & Hyde, J. S. The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. *Psychological Bulletin* **134**, 460–476 (2008).
73. Graham, S., Hebert, M. & Harris, K. R. Formative Assessment and Writing: A Meta-Analysis. *The Elementary School Journal* **115**, 523–547 (2015).
74. Hao, T., Wang, Z. & Ardasheva, Y. Technology-Assisted Vocabulary Learning for EFL Learners: A Meta-Analysis. *Journal of Research on Educational Effectiveness* **14**, 645–667 (2021).
75. He, Z. *et al.* Effects of Smartphone-Based Interventions on Physical Activity in Children and Adolescents: Systematic Review and Meta-analysis. *JMIR mHealth and uHealth* **9**, e22601 (2021).
76. Hernández-Jiménez, C. *et al.* Impact of Active Video Games on Body Mass Index in Children and Adolescents: Systematic Review and Meta-Analysis Evaluating the Quality of Primary Studies. *International Journal of Environmental Research and Public Health* **16**, 2424 (2019).
77. Ho, R. S.-T., Chan, E. K.-Y., Liu, K. K.-Y. & Wong, S. H.-S. Active video game on children and adolescents’ physical activity and weight management: A network meta-analysis. *Scandinavian Journal of Medicine & Science in Sports* **32**, 1268–1286 (2022).
78. Huang, Q., Peng, W. & Ahn, S. When media become the mirror: A meta-analysis on media and body image. *Media Psychology* **24**, 437–489 (2021).
79. Hurwitz, L. B. Getting a Read on Ready To Learn Media: A Meta-analytic Review of Effects on Literacy. *Child Development* **90**, 1754–1771 (2019).
80. Ivie, E. J., Pettitt, A., Moses, L. J. & Allen, N. B. A meta-analysis of the association between adolescent social media use and depressive symptoms. *Journal of Affective Disorders* **275**, 165–174 (2020).
81. Janssen, X. *et al.* Associations of screen time, sedentary time and physical activity with sleep in under 5s: A systematic review and meta-analysis. *Sleep Medicine Reviews* **49**, 101226 (2020).

82. Kates, A. W., Wu, H. & Coryn, C. L. S. The effects of mobile phone use on academic performance: A meta-analysis. *Computers & Education* **127**, 107–112 (2018).
83. Kim, J., Gilbert, J., Yu, Q. & Gale, C. Measures Matter: A Meta-Analysis of the Effects of Educational Apps on Preschool to Grade 3 Children’s Literacy and Math Skills. *AERA Open* **7**, 233285842110041 (2021).
84. Kong, Y., Seo, Y. S. & Zhai, L. Comparison of reading performance on screen and on paper: A meta-analysis. *Computers & Education* **123**, 138–149 (2018).
85. Kristensen, J. H., Pallesen, S., King, D. L., Hysing, M. & Erevik, E. K. Problematic Gaming and Sleep: A Systematic Review and Meta-Analysis. *Frontiers in Psychiatry* **12**, 675237 (2021).
86. Kroesbergen, E. H. & Van Luit, J. E. H. Mathematics Interventions for Children with Special Educational Needs: A Meta-Analysis. *Remedial and Special Education* **24**, 97–114 (2003).
87. Küçükalkan, K., Beyazsaçlı, M. & Öz, A. Ş. Examination of the effects of computer-based mathematics instruction methods in children with mathematical learning difficulties: A meta-analysis. *Behaviour & Information Technology* **38**, 913–923 (2019).
88. Lamb, R. L., Annetta, L., Firestone, J. & Etopio, E. A meta-analysis with examination of moderators of student cognition, affect, and learning outcomes while using serious educational games, serious games, and simulations. *Computers in Human Behavior* **80**, 158–167 (2018).
89. Lanca, C. & Saw, S.-M. The association between digital screen time and myopia: A systematic review. *Ophthalmic and Physiological Optics* **40**, 216–229 (2020).
90. Larwin, K. H. & Aspiranti, K. B. Measuring the Academic Outcomes of iPads for Students with Autism: A Meta-Analysis. *Review Journal of Autism and Developmental Disorders* **6**, 233–241 (2019).
91. Lee, J., Piao, M., Byun, A. & Kim, J. A systematic review and meta-analysis of intervention for pediatric obesity using mobile technology. *Nursing Informatics 2016* **225**, 491–494 (2016).
92. Liao, Y. C., Chang, H. & Chen, Y. Effects of Computer Application on Elementary School Student’s Achievement: A Meta-Analysis of Students in Taiwan. *Computers in the Schools* **24**, 43–64 (2007).
93. Liao, Y.-K. Effects of Computer-Assisted Instruction on Cognitive Outcomes: A Meta-Analysis. *Journal of Research on Computing in Education* **24**, 367–80 (1992).
94. Liao, Y., Liao, J., Durand, C. P. & Dunton, G. F. Which type of sedentary behaviour intervention is more effective at reducing body mass index in children? A meta-analytic review: Sedentary behaviour intervention effects. *Obesity Reviews* **15**, 159–168 (2014).
95. Li, S., Song, Y., Cai, Z. & Zhang, Q. Are active video games useful in the development of gross motor skills among non-typically developing children? A meta-analysis. *BMC Sports Science, Medicine and Rehabilitation* **14**, 140 (2022).
96. Li, F., Wang, X., He, X., Cheng, L. & Wang, Y. The effectiveness of unplugged activities and programming exercises in computational thinking education: A Meta-analysis. *Education and Information Technologies* **27**, 7993–8013 (2022).
97. Li, Q. & Ma, X. A Meta-analysis of the Effects of Computer Technology on School Students’ Mathematics Learning. *Educational Psychology Review* **22**, 215–243 (2010).
98. Li, C., Cheng, G., Sha, T., Cheng, W. & Yan, Y. The Relationships between Screen Use and Health Indicators among Infants, Toddlers, and Preschoolers: A Meta-Analysis and Systematic Review. *International Journal of Environmental Research and Public Health* **17**, 7324 (2020).

99. Liu, D., Baumeister, R. F., Yang, C. & Hu, B. Digital Communication Media Use and Psychological Well-Being: A Meta-Analysis. *Journal of Computer-Mediated Communication* **24**, 259–273 (2019).
100. Liu, M., Wu, L. & Yao, S. Dose–response association of screen time-based sedentary behaviour in children and adolescents and depression: A meta-analysis of observational studies. *British Journal of Sports Medicine* **50**, 1252–1258 (2016).
101. Liu, M., Pang, W., Guo, J. & Zhang, Y. A Meta-analysis of the Effect of Multimedia Technology on Creative Performance. *Education and Information Technologies* **27**, 8603–8630 (2022).
102. Liu, D., Ainsworth, S. E. & Baumeister, R. F. A Meta-Analysis of Social Networking Online and Social Capital. *Review of General Psychology* **20**, 369–391 (2016).
103. Liu, D. & Baumeister, R. F. Social networking online and personality of self-worth: A meta-analysis. *Journal of Research in Personality* **64**, 79–89 (2016).
104. Liu, M. *et al.* 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**, 5164 (2022).
105. Luckner, H., Moss, J. R. & Gericke, C. A. Effectiveness of interventions to promote healthy weight in general populations of children and adults: A meta-analysis. *European Journal of Public Health* **22**, 491–497 (2012).
106. Lu, G.-L. *et al.* The correlation between mobile phone addiction and coping style among Chinese adolescents: A meta-analysis. *Child and Adolescent Psychiatry and Mental Health* **15**, 60 (2021).
107. Luo, Y. *et al.* Is Increased Video Game Participation Associated With Reduced Sense of Loneliness? A Systematic Review and Meta-Analysis. *Frontiers in Public Health* **10**, 898338 (2022).
108. Madigan, S., McArthur, B. A., Anhorn, C., Eirich, R. & Christakis, D. A. Associations Between Screen Use and Child Language Skills: A Systematic Review and Meta-analysis. *JAMA Pediatrics* **174**, 665 (2020).
109. Mahdi, H. S. & Al Khateeb, A. A. The effectiveness of computer-assisted pronunciation training: A meta-analysis. *Review of Education* **7**, 733–753 (2019).
110. Major, L., Francis, G. A. & Tsapali, M. The effectiveness of technology-supported personalised learning in low- and middle-income countries: A meta-analysis. *British Journal of Educational Technology* **52**, 1935–1964 (2021).
111. Mallawaarachchi, S. R., Anglim, J., Hooley, M. & Horwood, S. Associations of smartphone and tablet use in early childhood with psychosocial, cognitive and sleep factors: A systematic review and meta-analysis. *Early Childhood Research Quarterly* **60**, 13–33 (33AD).
112. Marciano, L., Schulz, P. J. & Camerini, A.-L. Cyberbullying Perpetration and Victimization in Youth: A Meta-Analysis of Longitudinal Studies. *Journal of Computer-Mediated Communication* **25**, 163–181 (2020).
113. Marciano, L., Ostroumova, M., Schulz, P. J. & Camerini, A.-L. Digital Media Use and Adolescents’ Mental Health During the Covid-19 Pandemic: A Systematic Review and Meta-Analysis. *Frontiers in Public Health* **9**, 793868 (2022).
114. Mares, M.-L. & Pan, Z. Effects of Sesame Street: A meta-analysis of children’s learning in 15 countries. *Journal of Applied Developmental Psychology* **34**, 140–151 (2013).
115. Mares, M.-L. & Woodard, E. Positive Effects of Television on Children’s Social Interactions: A Meta-Analysis. *Media Psychology* **7**, 301–322 (2005).

116. Marino, C., Gini, G., Vieno, A. & Spada, M. M. The associations between problematic Facebook use, psychological distress and well-being among adolescents and young adults: A systematic review and meta-analysis. *Journal of Affective Disorders* **226**, 274–281 (2018).
117. Marker, C., Gnambs, T. & Appel, M. Exploring the myth of the chubby gamer: A meta-analysis on sedentary video gaming and body mass. *Social Science & Medicine* **301**, 112325 (2022).
118. Marshall, S. J., Biddle, S. J. H., Gorely, T., Cameron, N. & Murdey, I. Relationships between media use, body fatness and physical activity in children and youth: A meta-analysis. *International Journal of Obesity* **28**, 1238–1246 (2004).
119. Martins, N. C. *et al.* Influence of eating with distractors on caloric intake of children and adolescents: A systematic review and meta-analysis of interventional controlled studies. *Critical Reviews in Food Science and Nutrition* 1–10 (2022) doi:10.1080/10408398.2022.2055525.
120. Martins, N. & Weaver, A. The role of media exposure on relational aggression: A meta-analysis. *Aggression and Violent Behavior* **47**, 90–99 (2019).
121. Mazeas, A., Duclos, M., Pereira, B. & Chalabaev, A. Evaluating the Effectiveness of Gamification on Physical Activity: Systematic Review and Meta-analysis of Randomized Controlled Trials. *Journal of Medical Internet Research* **24**, e26779 (2022).
122. McArthur, G. *et al.* Phonics training for English-speaking poor readers. *Cochrane Database of Systematic Reviews* (2012) doi:10.1002/14651858.CD009115.pub2.
123. McArthur, G. *et al.* Phonics training for English-speaking poor readers. *Cochrane Database of Systematic Reviews* **2018**, (2018).
124. Mei, X. *et al.* Sleep problems in excessive technology use among adolescent: A systemic review and meta-analysis. *Sleep Science and Practice* **2**, 9 (2018).
125. Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W. & Davis, T. J. Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education* **70**, 29–40 (2014).
126. Moran, J., Ferdig, R. E., Pearson, P. D., Wardrop, J. & Blomeyer, R. L. Technology and Reading Performance in the Middle-School Grades: A Meta-Analysis with Recommendations for Policy and Practice. *Journal of Literacy Research* **40**, 6–58 (2008).
127. Mori, C., Temple, J. R., Browne, D. & Madigan, S. Association of Sexting With Sexual Behaviors and Mental Health Among Adolescents: A Systematic Review and Meta-analysis. *JAMA Pediatrics* **173**, 770 (2019).
128. Neitzel, A. J., Lake, C., Pellegrini, M. & Slavin, R. E. A Synthesis of Quantitative Research on Programs for Struggling Readers in Elementary Schools. *Reading Research Quarterly* **57**, 149–179 (2022).
129. Nesi, J. *et al.* Social media use and self-injurious thoughts and behaviors: A systematic review and meta-analysis. *Clinical Psychology Review* **87**, 102038 (2021).
130. Nikkelen, S. W. C., Valkenburg, P. M., Huizinga, M. & Bushman, B. J. Media use and ADHD-related behaviors in children and adolescents: A meta-analysis. *Developmental Psychology* **50**, 2228–2241 (2014).
131. Oh, C., Carducci, B., Vaivada, T. & Bhutta, Z. A. Digital Interventions for Universal Health Promotion in Children and Adolescents: A Systematic Review. *Pediatrics* **149**, e2021053852H (2022).

132. Oldrati, V. *et al.* Effectiveness of Computerized Cognitive Training Programs (CCTP) with Game-like Features in Children with or without Neuropsychological Disorders: A Meta-Analytic Investigation. *Neuropsychology Review* **30**, 126–141 (2020).
133. Oliveira, C. B. *et al.* Effects of active video games on children and adolescents: A systematic review with meta-analysis. *Scandinavian Journal of Medicine & Science in Sports* **30**, 4–12 (2020).
134. Oliveira, R. G. de & Guedes, D. P. Physical Activity, Sedentary Behavior, Cardiorespiratory Fitness and Metabolic Syndrome in Adolescents: Systematic Review and Meta-Analysis of Observational Evidence. *PLOS ONE* **11**, e0168503 (2016).
135. Ozdemir, M., Sahin, C., Arcagok, S. & Demir, M. K. The Effect of Augmented Reality Applications in the Learning Process: A MetaAnalysis Study. *Eurasian Journal of Educational Research* **18**, 1–22 (2018).
136. Öztop, F. & Nayci, Ö. Does the Digital Generation Comprehend Better from the Screen or from the Paper?: A Meta-Analysis. *International Online Journal of Education and Teaching* **8**, 1206–1224 (2021).
137. Paik, H. & Comstock, G. The Effects of Television Violence on Antisocial Behavior: A Meta-Analysis. *Communication Research* **21**, 516–546 (1994).
138. Park, J., Park, M.-J. & Seo, Y.-G. Effectiveness of Information and Communication Technology on Obesity in Childhood and Adolescence: Systematic Review and Meta-analysis. *Journal of Medical Internet Research* **23**, e29003 (2021).
139. Pearce, L. J. & Field, A. P. The Impact of ‘Scary’ TV and Film on Children’s Internalizing Emotions: A Meta-Analysis. *Human Communication Research* **42**, 98–121 (2016).
140. Peng, W., Lin, J.-H. & Crouse, J. Is Playing Exergames Really Exercising? A Meta-Analysis of Energy Expenditure in Active Video Games. *Cyberpsychology, Behavior, and Social Networking* **14**, 681–688 (2011).
141. Poorolajal, J., Sahraei, F., Mohamdadi, Y., Doosti-Irani, A. & Moradi, L. Behavioral factors influencing childhood obesity: A systematic review and meta-analysis. *Obesity Research & Clinical Practice* **14**, 109–118 (2020).
142. Powers, K. L., Brooks, P. J., Aldrich, N. J., Palladino, M. A. & Alfieri, L. Effects of video-game play on information processing: A meta-analytic investigation. *Psychonomic Bulletin & Review* **20**, 1055–1079 (2013).
143. Prescott, A. T., Sargent, J. D. & Hull, J. G. Metaanalysis of the relationship between violent video game play and physical aggression over time. *Proceedings of the National Academy of Sciences* **115**, 9882–9888 (2018).
144. Prizant-Passal, S., Shechner, T. & Aderka, I. M. Social anxiety and internet use – A meta-analysis: What do we know? What are we missing? *Computers in Human Behavior* **62**, 221–229 (2016).
145. Reynard, S., Dias, J., Mitic, M., Schrank, B. & Woodcock, K. A. Digital Interventions for Emotion Regulation in Children and Early Adolescents: Systematic Review and Meta-analysis. *JMIR Serious Games* **10**, e31456 (2022).
146. Rodriguez Rocha, N. P. & Kim, H. eHealth Interventions for Fruit and Vegetable Intake: A Meta-Analysis of Effectiveness. *Health Education & Behavior* **46**, 947–959 (2019).
147. Russell, S. J., Croker, H. & Viner, R. M. The effect of screen advertising on children’s dietary intake: A systematic review and meta-analysis. *Obesity Reviews* **20**, 554–568 (2019).

148. Ryan, A. W. Meta-Analysis of Achievement Effects of Microcomputer Applications in Elementary Schools. *Educational Administration Quarterly* **27**, 161–184 (1991).
149. Sadeghirad, B., Duhaney, T., Motaghipisheh, S., Campbell, N. R. C. & Johnston, B. C. Influence of unhealthy food and beverage marketing on children's dietary intake and preference: A systematic review and meta-analysis of randomized trials. *Obesity Reviews* **17**, 945–959 (2016).
150. Saiphoo, A. N., Dahoah Halevi, L. & Vahedi, Z. Social networking site use and self-esteem: A meta-analytic review. *Personality and Individual Differences* **153**, 109639 (2020).
151. Scherer, R., Siddiq, F. & Sánchez Viveros, B. The cognitive benefits of learning computer programming: A meta-analysis of transfer effects. *Journal of Educational Psychology* **111**, 764–792 (2019).
152. Scherer, R., Siddiq, F. & Sánchez Viveros, B. A meta-analysis of teaching and learning computer programming: Effective instructional approaches and conditions. *Computers in Human Behavior* **109**, 106349 (2020).
153. Schroeder, N. L., Adesope, O. O. & Gilbert, R. B. How Effective are Pedagogical Agents for Learning? A Meta-Analytic Review. *Journal of Educational Computing Research* **49**, 1–39 (2013).
154. Scionti, N., Cavallero, M., Zogmaister, C. & Marzocchi, G. M. Is Cognitive Training Effective for Improving Executive Functions in Preschoolers? A Systematic Review and Meta-Analysis. *Frontiers in Psychology* **10**, 2812 (2020).
155. Shahab, L. & McEwen, A. Online support for smoking cessation: A systematic review of the literature. *Addiction* **104**, 1792–1804 (2009).
156. Shannon, H., Bush, K., Villeneuve, P. J., Hellemans, K. G. & Guimond, S. Problematic Social Media Use in Adolescents and Young Adults: Systematic Review and Meta-analysis. *JMIR Mental Health* **9**, e33450 (2022).
157. Shin, Y., Kim, S. K. & Lee, M. Mobile phone interventions to improve adolescents' physical health: A systematic review and meta-analysis. *Public Health Nursing* **36**, 787–799 (2019).
158. Shin, M., Juventin, M., Wai Chu, J. T., Manor, Y. & Kemps, E. Online media consumption and depression in young people: A systematic review and meta-analysis. *Computers in Human Behavior* **128**, 107129 (2022).
159. Shudong Wang, Hong Jiao, Young, M. J., Brooks, T. & Olson, J. Comparability of Computer-Based and Paper-and-Pencil Testing in K–12 Reading Assessments: A Meta-Analysis of Testing Mode Effects. *Educational and Psychological Measurement* **68**, 5–24 (2008).
160. Slavin, R. E. & Lake, C. Effective Programs in Elementary Mathematics: A Best-Evidence Synthesis. *Review of Educational Research* **78**, 427–515 (2008).
161. Slavin, R. E., Lake, C. & Groff, C. Effective Programs in Middle and High School Mathematics: A Best-Evidence Synthesis. *Review of Educational Research* **79**, 839–911 (2009).
162. Slavin, R. E., Lake, C., Hanley, P. & Thurston, A. Experimental evaluations of elementary science programs: A best-evidence synthesis. *Journal of Research in Science Teaching* **51**, 870–901 (2014).
163. Slavin, R. E. Reading Effects of IBM's "Writing to Read" Program: A Review of Evaluations. *Educational Evaluation and Policy Analysis* **13**, 1 (1991).
164. Soo Jung, K. & Yan Ping, X. A Synthesis of Computer-Assisted Mathematical Word Problem-Solving Instruction for Students with Learning Disabilities or Difficulties. *Learning Disabilities: A Contemporary Journal* **20**, 27–45 (2022).

165. Stavrinou, D., Pope, C. N., Shen, J. & Schwebel, D. C. Distracted Walking, Bicycling, and Driving: Systematic Review and Meta-Analysis of Mobile Technology and Youth Crash Risk. *Child Development* **89**, 118–128 (2018).
166. Steele, J. L., Bozick, R. & Davis, L. M. Education for Incarcerated Juveniles: A Meta-Analysis. *Journal of Education for Students Placed at Risk (JESPAR)* **21**, 65–89 (2016).
167. Strong, G. K., Torgerson, C. J., Torgerson, D. & Hulme, C. A systematic meta-analytic review of evidence for the effectiveness of the “Fast ForWord” language intervention program. *Journal of Child Psychology and Psychiatry* **52**, 224–235 (2011).
168. Strouse, G. A. & Samson, J. E. Learning From Video: A Meta-Analysis of the Video Deficit in Children Ages 0 to 6 Years. *Child Development* **92**, E20–E38 (2021).
169. Suleiman-Martos, N. *et al.* Gamification for the Improvement of Diet, Nutritional Habits, and Body Composition in Children and Adolescents: A Systematic Review and Meta-Analysis. *Nutrients* **13**, 2478 (2021).
170. Sung, Y.-T., Chang, K.-E. & Yang, J.-M. How effective are mobile devices for language learning? A meta-analysis. *Educational Research Review* **16**, 68–84 (2015).
171. Sun, L., Hu, L. & Zhou, D. Which way of design programming activities is more effective to promote K-12 students’ computational thinking skills? A meta-analysis. *Journal of Computer Assisted Learning* **37**, 1048–1062 (2021).
172. Takacs, Z. K., Swart, E. K. & Bus, A. G. Benefits and Pitfalls of Multimedia and Interactive Features in Technology-Enhanced Storybooks: A Meta-Analysis. *Review of Educational Research* **85**, 698–739 (2015).
173. Takacs, Z. K., Swart, E. K. & Bus, A. G. Can the computer replace the adult for storybook reading? A meta-analysis on the effects of multimedia stories as compared to sharing print stories with an adult. *Frontiers in Psychology* **5**, (2014).
174. Takacs, Z. K. & Kassai, R. The efficacy of different interventions to foster children’s executive function skills: A series of meta-analyses. *Psychological Bulletin* **145**, 653–697 (2019).
175. Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C. & Schmid, R. F. What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study. *Review of Educational Research* **81**, 4–28 (2011).
176. Tekedere, H. & Göke, H. Examining the Effectiveness of Augmented Reality Applications in Education: A Meta-Analysis. *International Journal of Environmental and Science Education* **11**, 9469–9481 (2016).
177. Tingir, S., Cavlazoglu, B., Caliskan, O., Koklu, O. & Intepe-Tingir, S. Effects of mobile devices on K-12 students’ achievement: A meta-analysis: Effects of mobile devices. *Journal of Computer Assisted Learning* **33**, 355–369 (2017).
178. Tokac, U., Novak, E. & Thompson, C. G. Effects of game-based learning on students’ mathematics achievement: A meta-analysis. *Journal of Computer Assisted Learning* **35**, 407–420 (2019).
179. Tokunaga, R. S. A meta-analysis of the relationships between psychosocial problems and internet habits: Synthesizing internet addiction, problematic internet use, and deficient self-regulation research. *Communication Monographs* **84**, 423–446 (2017).
180. Tremblay, M. S. *et al.* Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity* **8**, 98 (2011).

181. Tsai, Y.-L. & Tsai, C.-C. Digital game-based second-language vocabulary learning and conditions of research designs: A meta-analysis study. *Computers & Education* **125**, 345–357 (2018).
182. Vahedi, Z., Sibalis, A. & Sutherland, J. E. Are media literacy interventions effective at changing attitudes and intentions towards risky health behaviors in adolescents? A meta-analytic review. *Journal of Adolescence* **67**, 140–152 (2018).
183. Vahedi, Z. & Zannella, L. The association between self-reported depressive symptoms and the use of social networking sites (SNS): A meta-analysis. *Current Psychology* **40**, 2174–2189 (2021).
184. van Ekris, E. *et al.* An evidence-update on the prospective relationship between childhood sedentary behaviour and biomedical health indicators: A systematic review and meta-analysis. *Obesity Reviews* **17**, 833–849 (2016).
185. van Grieken, A., Ezendam, N. P., Paulis, W. D., van der Wouden, J. C. & Raat, H. Primary prevention of overweight in children and adolescents: A meta-analysis of the effectiveness of interventions aiming to decrease sedentary behaviour. *International Journal of Behavioral Nutrition and Physical Activity* **9**, 61 (2012).
186. Vannucci, A., Simpson, E. G., Gagnon, S. & Ohannessian, C. M. Social media use and risky behaviors in adolescents: A meta-analysis. *Journal of Adolescence* **79**, 258–274 (2020).
187. van ’t Riet, J., Crutzen, R. & Lu, A. S. How Effective Are Active Videogames Among the Young and the Old? Adding Meta-analyses to Two Recent Systematic Reviews. *Games for Health Journal* **3**, 311–318 (2014).
188. Villegas-Navas, V., Montero-Simo, M.-J. & Araque-Padilla, R. A. The Effects of Foods Embedded in Entertainment Media on Children’s Food Choices and Food Intake: A Systematic Review and Meta-Analyses. *Nutrients* **12**, 964 (2020).
189. Wahi, G. Effectiveness of Interventions Aimed at Reducing Screen Time in Children: A Systematic Review and Meta-analysis of Randomized Controlled Trials. *Archives of Pediatrics & Adolescent Medicine* **165**, 979 (2011).
190. Wang, C., Lan, Y.-J., Tseng, W.-T., Lin, Y.-T. R. & Gupta, K. C.-L. On the effects of 3D virtual worlds in language learning – a meta-analysis. *Computer Assisted Language Learning* **33**, 891–915 (2020).
191. Wang, J., Li, M., Zhu, D. & Cao, Y. Smartphone Overuse and Visual Impairment in Children and Young Adults: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research* **22**, e21923 (2020).
192. Weng, P.-L., Maeda, Y. & Bouck, E. C. Effectiveness of Cognitive Skills-Based Computer-Assisted Instruction for Students With Disabilities: A Synthesis. *Remedial and Special Education* **35**, 167–180 (2014).
193. Williams, P. A., Haertel, E. H., Haertel, G. D. & Walberg, H. J. The Impact of Leisure-Time Television on School Learning: A Research Synthesis. *American Educational Research Journal* **19**, 19–50 (1982).
194. Wood, W., Wong, F. Y. & Chachere, J. G. Effects of media violence on viewers’ aggression in unconstrained social interaction. *Psychological Bulletin* **109**, 371–383 (1991).
195. Wouters, P., van Nimwegen, C., van Oostendorp, H. & van der Spek, E. D. A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology* **105**, 249–265 (2013).

196. Wouters, P. & van Oostendorp, H. A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education* **60**, 412–425 (2013).
197. Wu, Y., Amirfakhraei, A., Ebrahimzadeh, F., Jahangiry, L. & Abbasalizad-Farhangi, M. Screen Time and Body Mass Index Among Children and Adolescents: A Systematic Review and Meta-Analysis. *Frontiers in Pediatrics* **10**, 822108 (2022).
198. Xie, H. *et al.* Can Touchscreen Devices be Used to Facilitate Young Children’s Learning? A Meta-Analysis of Touchscreen Learning Effect. *Frontiers in Psychology* **9**, 2580 (2018).
199. Yang, Q., Liu, J. & Rui, J. Association between social network sites use and mental illness: A meta-analysis. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace* **16**, (2022).
200. Yin, X.-Q., de Vries, D. A., Gentile, D. A. & Wang, J.-L. Cultural Background and Measurement of Usage Moderate the Association Between Social Networking Sites (SNSs) Usage and Mental Health: A Meta-Analysis. *Social Science Computer Review* **37**, 631–648 (2019).
201. Yoon, S., Kleinman, M., Mertz, J. & Brannick, M. Is social network site usage related to depression? A meta-analysis of Facebook–depression relations. *Journal of Affective Disorders* **248**, 65–72 (2019).
202. Zhang, J., Yang, S. X., Wang, L., Han, L. H. & Wu, X. Y. The influence of sedentary behaviour on mental health among children and adolescents: A systematic review and meta-analysis of longitudinal studies. *Journal of Affective Disorders* **306**, 90–114 (2022).
203. Zhang, Y., Li, S. & Yu, G. The relationship between social media use and fear of missing out: A meta-analysis. *Acta Psychologica Sinica* **53**, 273–290 (2021).
204. Zhang, Y., Tian, S., Zou, D., Zhang, H. & Pan, C.-W. Screen time and health issues in Chinese school-aged children and adolescents: A systematic review and meta-analysis. *BMC Public Health* **22**, 810 (2022).
205. Zhang, G., Wu, L., Zhou, L., Lu, W. & Mao, C. Television watching and risk of childhood obesity: A meta-analysis. *The European Journal of Public Health* **26**, 13–18 (2016).
206. Zhang, J. *et al.* An updated of meta-analysis on the relationship between mobile phone addiction and sleep disorder. *Journal of Affective Disorders* **305**, 94–101 (2022).
207. Zheng, B., Warschauer, M., Lin, C.-H. & Chang, C. Learning in One-to-One Laptop Environments: A Meta-Analysis and Research Synthesis. *Review of Educational Research* **86**, 1052–1084 (2016).
208. Zhou, C., Occa, A., Kim, S. & Morgan, S. A Meta-analysis of Narrative Game-based Interventions for Promoting Healthy Behaviors. *Journal of Health Communication* **25**, 54–65 (2020).
209. Zucker, T. A., Moody, A. K. & McKenna, M. C. The Effects of Electronic Books on Pre-Kindergarten-to-Grade 5 Students’ Literacy and Language Outcomes: A Research Synthesis. *Journal of Educational Computing Research* **40**, 47–87 (2009).