

Comment



JEFFREY GREENBERG/UNIVERSAL IMAGES GROUP VIA GETTY

Taking part in activities outside of school can provide a healthy way for adolescents to explore their world.

Young people need experiences that boost their mental health

Andrew J. Fuligni & Adriana Galván

More policymakers and practitioners should encourage exploration and discovery during youth, to prevent adolescents from reaching crisis.

As co-directors of the UCLA Center for the Developing Adolescent at the University of California, Los Angeles, we are often contacted by concerned community members and reporters searching for an explanation for troubling increases in mental-health problems among adolescents. (Our centre disseminates the science of adolescent development to policymakers and practitioners, to inform policies and programmes for those aged between 10 and 25.)

Over the past 15 years or so, the prevalence of depression and suicidality (which encompasses suicidal thoughts, plans or attempts) in people aged around 10–24 has risen – at least among those for whom data are available (see ‘Trends in adolescent mental health’). Invariably, those who contact us want to talk about the presumed culprit: the rise of social media.

Yet three decades of research, predominantly in neuroscience and developmental psychology, suggests that there might be a better way to help young people than

Comment

focusing on single-cause explanations for their mental-health issues: ensuring that they are exposed to conditions and experiences that are known to help adolescents thrive.

More policymakers and practitioners – from parents and educators to psychologists and paediatricians – should be drawing on the body of research that shows how adolescence can be supported as a key developmental window of exploration and discovery. Specifically, this means providing young people with safe ways to try new things; giving them opportunities to contribute to other people's lives; and helping them to foster healthy relationships with parents and other caring adults. It also means helping young people to get enough sleep to enable the discovery and learning that is so important at this time of life.

Support the age of discovery

In recent years, mental-health professionals, parents and educators have been demanding immediate action to address the mental-health needs of today's youth.

In 2019, the World Health Organization called for investments in mental-health care around the world, and for special priority to be given to children and adolescents (see Supplementary information for further reading). In 2021, the American Academy of Pediatrics and other key US children's health organizations declared a national emergency. In the same year, US surgeon general Vivek Murthy, the leading spokesperson in the federal government on matters of public health, called for a "whole-of-society effort" to address youth mental health.

Such calls are important for addressing the needs of those already in distress. But, in our view, much more could be done to prevent mental-health crises from developing in young people in the first place. All sorts of findings – admittedly from studies conducted largely in North America or Europe – suggest that adolescence is a time of opportunity, as well as a time of risk-taking.

Numerous studies indicate that brain development during adolescence supports a crucial period of learning and discovery that involves – appropriately – more risk-taking and greater sensitivity to certain external cues.

Brain imaging has shown, for instance, that limbic regions important for learning and motivation are more active in youth than in adults and younger children¹. (The age of participants classed as youth or adolescents can differ between studies.) Neuroscientists have also linked greater connectivity between limbic regions and prefrontal neural networks in youth to enhanced performance in various cognitive skills, including decision-making and working memory².

Experiments involving psychological tasks have shown that adolescents are more tolerant

of uncertainty than are adults. In a 2012 study, for example, adolescents were more willing than adults to keep playing a game in which the likelihood of winning or losing money was uncertain³. They are more likely than younger or older groups to actively explore new solutions in learning tasks. And they outperform adults both in updating their previous knowledge when they make errors or encounter new environments⁴, and in decision-making tasks that require them to estimate uncertainty and change in the environment⁵.

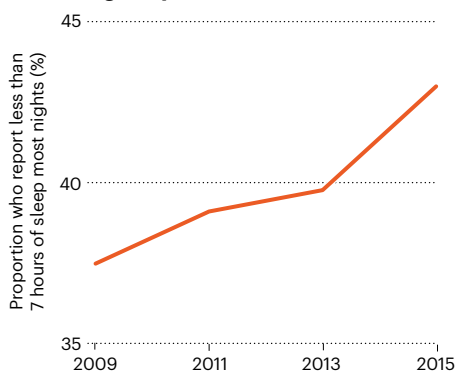
"Youth need healthy ways to channel their motivation to explore their world."

In the context of these findings, adolescents' greater willingness to take risks than other age groups can be understood as an adaptive, essential part of exploring the world around them. Research in rodents shows that the developing brain has more of the molecular machinery – dopamine and dopamine receptors – needed to perceive new experiences as rewarding than do adult animals⁶. Likewise, adolescents' greater reactivity to stress⁷ – as shown by experimental studies and observational work involving them reporting their

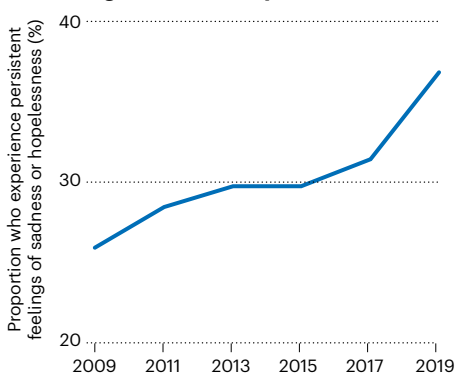
PAYING FOR LATE NIGHTS?

More US high-school students* have reported getting less sleep in recent years. A greater proportion are also experiencing feelings of sadness or hopelessness.

Worsening sleep



Worsening mental-health problems



*9th to 12th graders (ages 14–18) in the Youth Risk Behavior Surveillance System.

day-to-day experiences – reflects the fact that they are in a particularly sensitive, responsive stage in their development.

More policymakers, educators, paediatricians, psychiatrists, parents, schools and other institutions should be using this pivotal window in development to influence the mental health and life trajectories of young people. Three experiences in particular seem to be key during this period.

First, youth need healthy ways to channel their motivation to explore their world. These could be school-based extracurricular activities, special-interest clubs and sports or community-based activities, such as volunteering in social-service agencies. But to have the greatest impact, programmes must be designed thoughtfully. A 2014 meta-analysis⁸ showed, for example, that community service positively affected all sorts of measures in young people aged 12–20. These ranged from participants' thoughts about themselves to their level of motivation in school. But this happened only if participants were also given an opportunity to process their experiences, such as through keeping a journal or in group discussions.

Second, young people need opportunities to contribute to the lives of others. Both survey work and experiments in developmental psychology have shown that adolescents become increasingly attuned to their position and role in the world as they age. This might manifest as a greater concern about their status among peers, or as an increased awareness of how factors such as ethnicity and economic background shape their standing in society. They also increasingly explore different ways to play a part in society through their jobs, families and activities.

And various studies indicate that, whether young people are helping their families with chores or through financial contributions, providing emotional support to friends or volunteering in their communities, they seem to be primed to contribute in many ways^{9–11}.

Experimental interventions and surveys have also shown that opportunities to contribute to others' lives – either informally or through volunteering, youth leadership programmes and community engagement – can have multiple effects on adolescent well-being.

In a 2013 clinical trial, adolescents who spent 2 months volunteering with children aged 5–11 had lower levels of the pro-inflammatory cytokine interleukin-6 and cholesterol, and were less likely to be overweight¹² compared with a control group. (Both body weight and biological markers of inflammation have been linked to depression and other mental-health problems.) In correlational work in behavioural psychology, contributing to others has been linked to adolescents having a greater sense of meaning



A young volunteer teaches children in a makeshift school at a camp near Mogadishu, Somalia, for people displaced by famine.

and purpose – which can, in turn, promote better mental health, especially for youth from marginalized groups¹³.

Third, adolescents need healthy relationships with parents and other adults: these are essential for young people's mental health and well-being.

Data from questionnaires, for instance, show that adolescents who have secure and supportive relationships with their parents or other carers have lower levels of depression and a stronger sense of identity than do those with insecure relationships¹⁴. Caring, affectionate and validating parenting behaviours – collectively known as positive parenting – have also been linked to the maturation of certain brain regions that are associated with the regulation of emotions, such as the amygdala¹⁵.

Many studies have shown that interventions to improve relationships in families, introduced by public-health and psychology researchers over the past three decades, can reduce the use of substances and improve mental health in youth¹⁶. (Interventions include the use of educational tools to increase parental or carer involvement in adolescents' daily lives, guidance on how to improve communication between adolescents and their carers, and linking carers to external support services.)

Other studies, largely from behavioural psychology and education research, have shown that relationships with caring adults outside the family home can also be important

in shaping the lives of young people.

Sports and other extracurricular activities can help to introduce youth to adult mentors. And various studies examining the importance of role models suggest that formal mentoring programmes, such as those involving a young adult in the community spending time with an adolescent, can positively affect the men-

“Researchers should try to improve their understanding of the unique challenges facing adolescents today.”

tal health of youth¹⁷. Mentoring seems to be particularly important for adolescents with unstable home environments, such as those who experience homelessness or are in the foster-care system.

Prioritize healthy sleep

What could be crucial to the effectiveness of these experiences, however, is ensuring that adolescents get enough sleep.

Sufficient sleep is likely to be pivotal to enabling the exploration and discovery that is so important at this time of life. Both correlational and experimental studies (mainly in adults) have shown that regular and sufficient amounts of sleep enhance many types of learning. Research has shown, for example, that sleep-deprived people are more likely to have lapses in attention, deficits in working

memory, decreased memory encoding and compromised reinforcement learning¹⁸ than are control groups. In someone who is sleep-deprived, the amygdala – which is involved in emotional reactivity to a stressor – is more easily activated¹⁹ and the brain is less capable of accurately coding incremental increases in the value of a reward²⁰.

What's more, epidemiological studies in US school students aged 14–18 have shown two trends in recent years: declines in mental health (see go.nature.com/3e8apts) and reductions in the amount of sleep²¹ – although it is hard to show a causal link between these historical changes (see 'Paying for late nights?'). Various sociocultural factors could be contributing to this drop-off in sleep. These include the use of digital media before bed, pressures around schoolwork and early-morning or late-evening extracurricular activities.

Also, studies indicate that mental health during adolescence is particularly sensitive to sleep. There is a consistent link between sleep problems and most of the psychiatric disorders that are evident during this period, including attention deficit hyperactivity disorder, anxiety and depression²².

Delaying school start times, reducing homework and introducing family-based interventions that promote healthy sleep habits (such as quiet times before bed or the removal of phones at night) have shown promise. When the Seattle School District in Washington state delayed high-school start times by nearly one

Comment

hour in 2016–17, for instance, students' sleep increased by about 34 minutes each night and grades improved by 4.5% (ref. 23). Other studies have shown similar effects of later school start times²⁴.

Understand today's youth

It is not only policymakers and practitioners who should give more attention to the experiences and conditions that help adolescents to thrive – although our call is directed mainly towards them.

Scientists could dig deeper into what kinds of intervention are most effective for supporting adolescents – ideally using best principles and practices for involving young people as partners in discovery, rather than just as participants. Researchers should also try to improve their understanding of the unique challenges facing adolescents today – as well as the diversity of concerns that emerge in countries and settings around the world.

Much of the existing research on youth development and mental health is based on adolescents from high-income, predominantly Western nations. Moreover, researchers often study only those countries' majority populations. To determine which specific mental-health needs could be supported worldwide, more neuroscientists, psychologists and psychiatrists need to study adolescents in the global south and in minority groups, and attend to the local circumstances of each country and community.

Some concerns for contemporary youth cross national borders. In such cases, international collaborations could help to improve collective understanding.

For instance, a 2021 literature review searched studies published since 2016 for terms such as climate anxiety and climate mental health. The review was conducted by the See Change Institute, a California-based non-profit organization that studies the role of human behaviour in social and environmental change, in collaboration with others. According to its results, climate change is an existential concern for many US adolescents and young adults, who will have to contend with the increasingly concerning environmental, social and economic effects of a warming world in their lifetimes (see go.nature.com/3ejph7t).

Similar findings have emerged from global surveys. In a 2021 study of 10,000 youth aged 16–25 in 10 countries, 84% of respondents were at least moderately worried about climate change; 59% were very or extremely worried²⁵.

Today's youth are the future leaders, innovators and citizens who will confront profoundly challenging issues such as climate change and rising social inequalities. It is thus not enough to help them to manage their mental health once they are in crisis. Enabling adolescents to discover their place in the world begins with

Trends in adolescent mental health

Depression and suicidality has risen among adolescents worldwide in recent decades.

The prevalence estimates for mental-health problems in young people represent less than 7% of adolescents globally. With this caveat in mind, according to the World Health Organization, one in seven of those aged 10–19 worldwide are currently experiencing a mental-health disorder, including anxiety and depression. And among those aged 15–19, suicide is the fourth leading cause of death globally.

In countries for which detailed data are available, the figures suggest that substantial proportions of adolescents experience distress. According to an April report by the US Centers for Disease Control and Prevention, for example, 44% of students in grades 9–12 (ages 14–18) felt persistently sad or hopeless during the previous 12 months (see go.nature.com/3srxstsp).

There is no clear single explanation for recent trends. A meta-analysis of 29 studies, covering nearly 81,000 children aged 18 or younger, indicates that the COVID-19 pandemic has had a negative impact on

adolescent mental health globally²⁶. Yet multiple indicators – adolescents' own reports of sadness and suicidality, the number of psychiatric visits to emergency departments and suicide rates – suggest that mental-health challenges were increasing in countries such as the United States well before the pandemic.

Social media is often blamed for this rise. Most experts acknowledge that using digital media in a way that interferes with sleep or in-person interactions and other healthy behaviours is not conducive to good mental health. However, most meta-analyses, cohort studies involving hundreds of participants, and other rigorous, well-designed studies suggest that associations between the use of digital media and mental health are relatively small and probably of little clinical significance²⁷.

Other potential single-cause explanations are similarly unconvincing. Adolescents, parents or other carers being more willing to discuss issues with each other and with health-care providers, for example, might contribute to increased reports of sadness and negative mood from adolescents. But this in itself is unlikely to be driving the rising rates of suicidality.

adults having a better appreciation of young people's unique strengths, and supporting their ability to thrive.

The authors

Andrew J. Fuligni and **Adriana Galván** are co-executive directors at the UCLA Center for the Developing Adolescent, Los Angeles, California, USA. **A.J.F.** is professor of psychiatry and biobehavioral sciences and of psychology, and **A.G.** is professor of psychology and of psychiatry and biobehavioral sciences, at the University of California, Los Angeles, California, USA. e-mails: afuligni@ucla.edu; agalvan@ucla.edu

1. DePasque, S. & Galván, A. *Neurobiol. Learning Memory* **143**, 1–7 (2017).
2. van den Bos, W., Cohen, M. X., Kahnt, T. & Crone, E. A. *Cereb. Cortex* **22**, 1247–1255 (2012).
3. Tymula, A. et al. *Proc. Natl Acad. Sci. USA* **109**, 17135–17140 (2012).
4. Hauser, T. U., Iannaccone, R., Walitza, S., Brandeis, D. & Brem, S. *NeuroImage* **104**, 347–354 (2015).
5. Eckstein, M. K., Master, S. L., Dahl, R. E., Wilbrecht, L. & Collins, A. G. E. *Dev. Cogn. Neurosci.* **55**, 101106 (2022).
6. Laviola, G., Pascucci, T. & Pieretti, S. *Pharmacol. Biochem. Behav.* **68**, 115–124 (2001).
7. Eiland, L. & Romeo, R. D. *Neuroscience* **249**, 162–171 (2013).

8. van Goethem, A., van Hoof, A., Orobio de Castro, B., van Aken, M. & Hart, D. *Child Dev.* **85**, 2114–2130 (2014).
9. Fuligni, A. J. *Perspect. Psychol. Sci.* **14**, 331–343 (2019).
10. Damon, W. *The Path to Purpose: Helping Our Children Find Their Calling in Life* (Free Press, 2009).
11. Karan, M. et al. *Develop. Cogn. Neurosci.* **56**, 101128 (2022).
12. Schreier, H. M. C., Schonert-Reichl, K. A. & Chen, E. *JAMA Pediatr.* **167**, 327–332 (2013).
13. Sumner, R., Burrow, A. L. & Hill, P. L. *Am. Psychol.* **73**, 740–752 (2018).
14. Bond, L., Toumbourou, J. W., Thomas, L., Catalano, R. F. & Patton, G. *Prev. Sci.* **6**, 73–88 (2005).
15. Whittle, S. et al. *Develop. Cogn. Neurosci.* **8**, 7–17 (2014).
16. Kim, H. K. & Leve, L. D. *J. Consult. Clin. Psychol.* **79**, 740–750 (2011).
17. McQuillin, S. D., Hagler, M. A., Werntz, A. & Rhodes, J. E. *Am. J. Community Psychol.* **69**, 201–220 (2022).
18. Krause, A. J. et al. *Nature Rev. Neurosci.* **18**, 404–418 (2017).
19. Yoo, S.-S., Gujar, N., Hu, P., Jolesz, F. A. & Walker, M. P. *Curr. Biol.* **17**, R877–R878 (2007).
20. Venkatraman, V., Chuah, Y. M. L., Huettel, S. A. & Chee, M. W. L. *Sleep* **30**, 603–609 (2007).
21. Twenge, J. M., Krizan, Z. & Hisler, G. *Sleep Med.* **39**, 47–53 (2017).
22. Tarokh, L., Saletin, J. M. & Carskadon, M. A. *Neurosci. Biobehav. Rev.* **70**, 182–188 (2016).
23. Dunster, G. P. et al. *Sci. Adv.* **4**, eaau6200 (2018).
24. Goldin, A. P., Sigman, M., Braier, G., Golombek, D. A. & Leone, M. J. *Nature Hum. Behav.* **4**, 387–396 (2020).
25. Hickman, C. et al. *Lancet Planet. Health* **5**, e863–e873 (2021).
26. Racine, N. et al. *JAMA Pediatr.* **175**, 1142–1150 (2021).
27. Odgers, C. L. & Jensen, M. R. *J. Child Psychol. Psychiatr.* **61**, 336–348 (2020).

The authors declare no competing interests. Supplementary information accompanies this article: see go.nature.com/3fktjnj