Teen students in U.S.: Stressed for success

A current school of thought holds that teenagers living in Asian countries pay a psychological price for their mathematical superiority to adolescents in the United States. Some U.S. parents and teachers suspect that high-achieving Asian students feel more nervous, depressed, and overburdened in response to the pressures of maintaining academic eminence.

A cross-cultural study now supports a link between mathematics success in high school and frequent psychological distress—but only for U.S. students, not those in Japan or Taiwan.

"High academic achievement, such as that exhibited by students in Taiwan and Japan, can be attained without necessarily increasing students' reports of psychological distress," contend David S. Crystal and Harold W. Stevenson, both psychologists at the University of Michigan in Ann Arbor, and their coworkers.

A teenager's peers and family in the two Asian countries typically help to maintain academic achievement through various forms of support, Crystal's team asserts. But U.S. high achievers get torn between the desire to spend extra time on their studies and to pursue myriad nonacademic interests touted by peers and parents, they argue. These include socializing with friends, playing sports, dating, and working at a part-time job.

Moreover, the same researchers have found that parents and children express lower expectations for academic success in the United States than in Japan and Taiwan (SN: 1/9/93, p.28).

Crystal and his colleagues administered questionnaires to 1,386 U.S., 1,633 Taiwanese, and 1,247 Japanese eleventh graders, who averaged 17 years old. Participants rated the frequency with which they felt stressed or pressured, depressed, aggressive (such as wanting to hit someone or destroy something), and anxious about school work. They also noted anxiety-related physical complaints, such as headaches, stomachaches, and sleep troubles.

The researchers interviewed approximately 200 additional eleventh graders in each country. Native speakers of each language asked these students to explain when and why they felt stressed or depressed at home, at school, and in other situations.

All volunteers took a challenging mathematics test. Items ranged from calculating fractions and percentages to the solution of problems of limits and the addition of tangents and secants.

Although students in Japan and Taiwan noted greater parental dissatisfaction with their school work and higher parental expectations for academic performance than did U.S. students, the former groups also cited less frequent stress, anxiety, and aggression, the researchers report in the June CHILD DEVELOPMENT.

Japanese teenagers reported the fewest instances of depressed mood and physical problems, whereas Taiwanese youngsters noted the greatest frequency of those conditions. In a comparison of those with high and low scores on the math test, Asian high scorers reported less emotional and physical distress than low scorers. In contrast, U.S. high scorers cited these symptoms more frequently than low scorers.

Interviews indicated that more students in the United States and Taiwan than in Japan regarded school as a source of stress. Only U.S. teens mentioned sports and part-time jobs as additional causes of tension. Japanese students most often cited peers as stressful.

High achievers in the United States devoted much more time to studying than low-achieving peers but expressed the same level of interest in out-of-school activities, the scientists note. "Adolescent culture" in the United States may present academic achievers with the most conflict over how to arrange daily activities, they argue. *—B. Bower*

Sudden death decimated ancient oceans

Life on Earth had a close call 250 million years ago, when 96 percent of marine species went belly up. Paleontologists have long thought that the mass extinction occurred gradually—over millions of years—a pattern implicating slow environmental change as the culprit. But a new study quickens the mystery's pace.

In the July GEOLOGY, Kun Wang of the University of Ottawa and his colleagues suggest that planktonic ocean plants died in a geologic instant, rapidly knocking out the base of the marine food web. "We know the extinction has to be abrupt. It could be a few days, or a few months, or a few thousand years. But it's definitely not a few million years," Wang says.

The extinctions at the end of the Permian period exceed all other known die-offs, including the more famous one apparently caused by an asteroid or comet 65 million years ago, which wiped out the last dinosaurs.

For their study of the Permian, the Canadian team collected a section of well-preserved shales and cherts from northeastern British Columbia. These rocks formed when the region lay at the bottom of an inland basin.

The researchers gleaned information about the health of the ancient ocean by isolating from the rock small amounts of kerogen, the decomposed residue of Permian plankton. Right at the boundary between the Permian and Triassic periods, the kerogen records a sharp drop in the ratio between heavy carbon-13 atoms and light carbon-12 atoms, Wang says.

To interpret the shift in carbon isotopes, the researchers exploited the fact that plants tend to avoid carbon-13 as they grow during photosynthesis. Because of the vast number of phytoplankton competing for carbon-12 during normal times, however, the plants typically incorporate some carbon-13. But a sudden die-off of most phytoplankton would give survivors greater access to carbon-12. When they fall to the ocean floor and get incorporated into sedimentary rocks, they reduce the ratio of carbon-13 to carbon-12 within the rock, Wang explains.

Geochemists who study inorganic carbon, which is derived from the shells of ancient plankton, have previously detected abrupt drops in the carbon isotopic ratio at the end of the Permian. But because many factors can alter this ratio, researchers could not isolate what caused the change. Fewer processes affect the carbon isotopic ratio in kerogen, strengthening the case that the surface ocean suffered a biological crisis, says Wang.

"It's consistent with some sort of catastrophic event, like an [asteroid] impact or a huge volcanic eruption," he says. As yet, he adds, researchers have not found evidence of any impact at the end of the Permian. However, the largest lava outpourings known on Earth were going on in Siberia at roughly this time.

Geochemist Lisa M. Pratt of Indiana University in Bloomington lauds Wang and his colleagues, but cautions their plankton conclusions remain controversial. "It's the first data that provides strong evidence. It's not unequivocal, but it's pretty exciting," she says.

Paleontologist Douglas Erwin with the Smithsonian Institution in Washington, D.C., says fossil evidence shows the Permian extinctions started gradually and had a more rapid pulse at the end. "That pulse doesn't necessarily mean 50,000 years or overnight. We can't tell the time well enough. There are a lot of people who would like a catastrophic extinction at the end of the Permian and comets falling out of the sky. But you do run up against the fact that we don't have the data to support it." *—R. Monastersky*