MEDIA MONITORS
INCISIVE INSIGHT

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ALL IN THE BRAIN | Humans wired for extreme conditions

Science of adrenalin

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TRANS-Tasman kayaker Andrew McAuley disappeared a few weeks ago in the ocean, leaving behind a young family.

Australian Kay Cottee, became the first woman to sail solo, unassisted and non-stop around the world in June 1988.

Earlier this year Adelaide mountain climber Duncan Chessell reached with his team the highest peak in the Antarctic after 300km trekking across glaciers.

We read of such events with feelings of admiration for their courage and tenacity, mixed with sadness for the occasional death and suffering which accompanies their quest for adventure.

What drives such individuals? A British study estimated that 1 in 7 adults are involved in such activities. The roots of this behaviour may be found in our distant past, when modern humans emerged around 150,000 years ago with new abilities that included the drive to exploration, and consequent migration, literally to all corners of the earth.

Drive to exploration requires at least three features: Curiosity, the ability to endure a significant degree of suffering and a certain control of fear in the face of dangers while performing extraordinary physical feats, that may even be pleasurable.

These drives, selected by evolution, are "wired" into our brain circuits.

Evolutionary principles suggest the brain experiences as good and pleasurable what is advantageous.

Thus humans are probably wired to get pleasure out of explorations even in extreme conditions.

How is endurance wired in our brains? Endogenous opioids (natural forms of "morphine" of the brain) are used as transmitters between nerve cells in circuits, which are activated in the brain by extreme physical efforts and bodily stress. These help to reduce pain and fatigue during extreme conditions and to reduce fear during physically dangerous activities.

How is curiosity wired in our brains? In addition to "cognitive" curiosity which helps exploratory behaviour, curiosity also involves physical and social thrillseeking behaviours, collectively known as "novelty-seeking" behaviours, with associated "impulsive" behaviour.

Exploration is not something readily accessible to urban people. Thus extreme activities in modern society involve short-lasting, but intense activities, generically known as "thrill-seeking", prevalent in male adolescents and young adults. It may not be by chance that they reach their peak in parallel with their sexual maturation.

These activities depend on brain circuits involving the neurotransmitters, dopamine and serotonin, that mediate sense of pleasure and reduction of fear during dangerous and physically demanding situations. Genes that control the brain dopamine and serotonin functions are prime candidates in the search for the genetic and social factors underlying these behaviours.

Thrill-seeking activities are accompanied by appropriate bodily changes including increased blood flow, heightened pulse rate, and increased physical performance (hence the popular reference to "adrenalin rush"), which thrill-seekers find an enjoyable and invigorating state of mind and body. The very "reward" nature of these brain areas may explain the greater susceptibility of thrill-seekers to drug abuse or risky behaviour.Modern thrill-seeking activities include extreme sports such rock climbing, mountaineering, ice climbing, bungee jumping, BASE jumping, mountain biking, kayaking, windsurfing, skydiving, kite surfing, BMX rides, wave surfing, hang gliding, whitewater rafting, tightrope walking, cave diving, cave exploration. Also, wars are likely to use the same brain circuits for aggression as for thrill-seeking behaviour. Could it be that such brain circuits have driven thousand of courageous young fellows across the battlefields to their deaths? Young adult males show higher levels of physical aggression, violence, and homicides coinciding with a period when reproductive competition is most intense.

Neuroscience may help us to understand better the social conditions of violence.

What should we make of all this? Our increasing knowledge of the neuroscience bases of our ancient biological and social roots of curiosity, endurance and pleasure in physical risk, should help us to view these as part of our human nature and to accept adventures, thrill-seeking activities and extreme sports as legitimate


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ADVENTURERS: Kayaker Andrew McAuley, sailor Kay Cottee and climber Duncan Chessell.

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human activities. These activities represent the end of a spectrum of behaviours that have enabled humans to survive and populate the whole Earth. They remind us of the need to balance the reflective and impulsive mechanisms of our brains to integrate motivation, cognition and behaviour.

As many others, I have enjoyed, with safety, the thrill of climbing mountain peaks in most continents, exploring uncharted icefields in Patagonia and have windsurfed twice, with friends, across the Spencer Gulf. I suspect that my brain was bathed in the bliss of its endogenous pleasure substances. I needed no drugs.

Most amusement parks these days offer the most extraordinary thrill activities in the multitude of rollercoasters and other rides to please the most extreme thrill-seeker. These are definitely safer activities compared to their equivalent in the wilderness. Sports competitions are good ways to develop safe thrillseeking skills for survival.

Perhaps it is better to accept the risk and a few sad casualties than suppress the legacies of our evolutionary past, which is still strongly with us.

It is in our brains. We better learn to humanise these drives rather than demonise them.

Marcello Costa is Professor of Neurophysiology at Flinders University and Co-chair of the South Australian Neuroscience Institute.