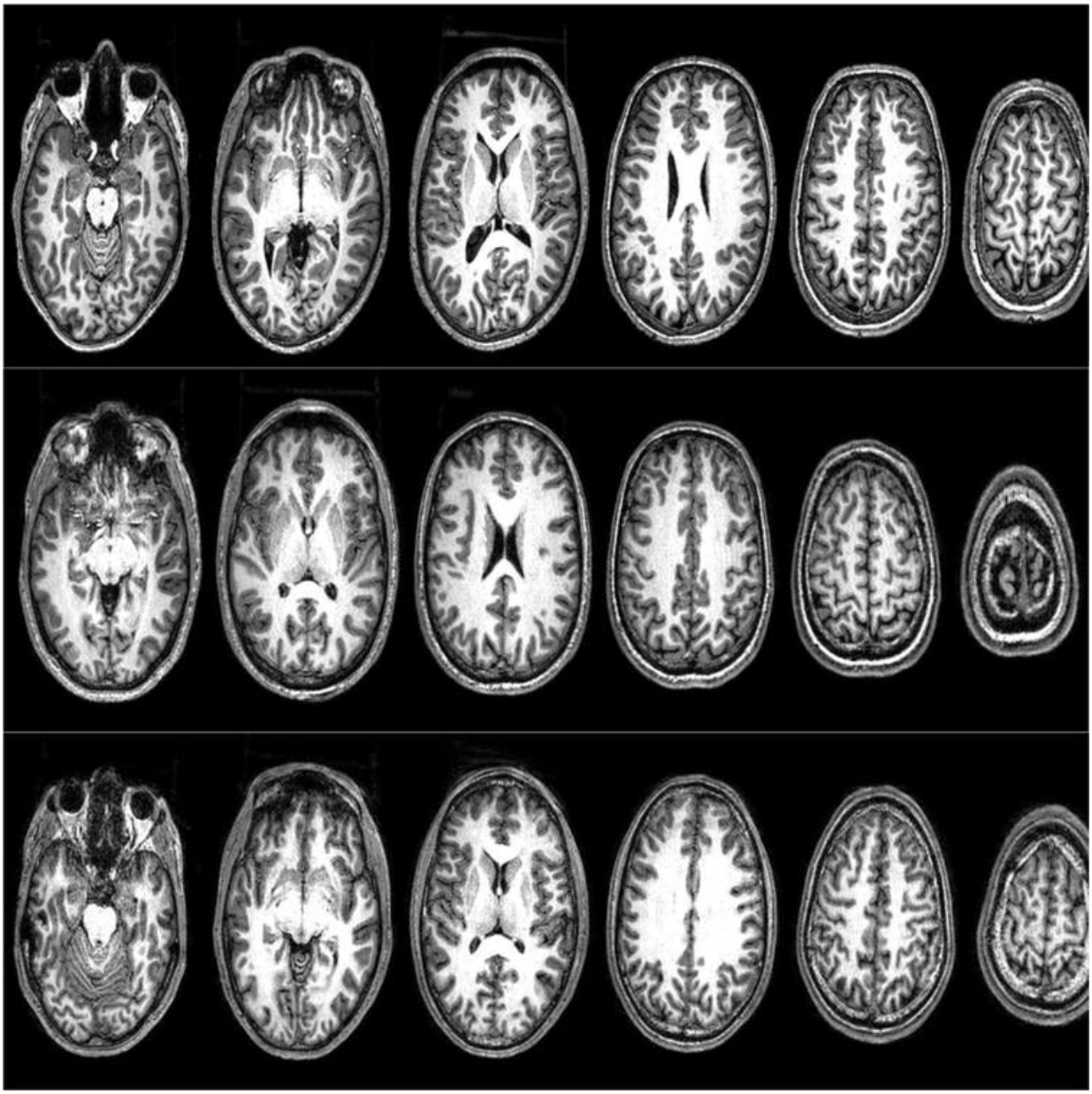
The neuroscience of terrorism: How we convinced a group of radicals to let us scan their brains

June 12 2019, by Nafees Hamid And Clara Pretus



Brain scans from three ‘radicals’ who took part in the Barcelona studies. Credit: Nafees Hamid and Clara Pretus, Author provided

The young man sitting in the waiting room of our neuroimaging facility wearing skinny jeans and trainers looked like a typical Spanish 20-year-old of Moroccan origin. Yassine was bouncy, chatting up the research assistants, and generally in good spirits. (All names in this article have been changed.) He was like so many other Barcelona youths, except he openly expressed a desire to engage in violence for jihadist causes.

As we took him through a battery of tests and questionnaires, we were barely able to keep him in his seat as he kept proclaiming his willingness to travel to Syria to kill himself. "I would go tomorrow, I would do it tomorrow," he said. When we probed for the sincerity of his claim, he responded, "only if we go together. You pay for the tickets," with a wink and a smile. Less budding foreign fighter and more extremist provocateur, he enjoyed insulting us with impunity and showed us the middle finger as he left. And yet, Yassine agreed to let us scan his brain—for the first ever brain scan study on radicalization.

Imagine being a young Muslim man, walking down the street in Barcelona, when you're approached by a stranger asking if they can do a survey with you. The survey is on your religious, political and cultural values. This might sound fine, if it weren't for a few details: we were at the height of Islamic State's reign in Syria and Iraq and the survey questions included questions about creating a worldwide caliphate, being ruled by strict Sharia law and engaging in armed jihad.

You're then told the reason for the survey is to find people suitable for a

brain scan. And those few people would be the most radicalized ones we could find; a fact that would only be revealed in the post-experiment debrief. To our surprise, the part about the brain scans piqued people's interest.

The responses varied from concerned: "You think there's something wrong with my brain?", to pride: "There's definitely something different about my brain." Even the most hardcore jihadist supporters tapped into their nerdy side and started asking questions about how the brain works, what we've found in other studies, and what might the implications be of this research. Some would even ask us for medical advice (we had to explain that we weren't those kind of doctors). Once satisfied about the scientific merit of the work, most consented to participate.

As Ahmed, a 31-year-old Pakistani immigrant and staunch supporter of Al Qaida, told us: "People like us, our brains are so different. You can't compare us to others. But go ahead and try. It's interesting what you're doing."

But he had one very important condition to be satisfied before agreeing to participate. He leaned in close, as if there could be someone listening, and whispered: "Can I get a picture of my brain? Just to prove to my mother that I have one." Humour was never in short supply among our participants.

We carried out two brain studies in Barcelona between between 2014 and 2017. Spain ranks among Europe's top countries for failed and completed terror attacks and the greater Barcelona region is the country's primary recruitment hotspot. In fact, it was during our fieldwork that the Islamic State-inspired attacks in Barcelona and Cambrils took place in August 2017, killing 16 civilians and injuring 152 others.

Given that our aim was to study willingness to engage in violence for

cultural and religious values, we needed a sample of people with the same cultural background and language. So, we recruited Sunni Muslim men of Moroccan and Pakistani origin (the two largest groups of Sunni Muslims in the province of Barcelona) to participate in our studies.

Despite years of research to the contrary, two oversimplified categories of thinking about violent extremism still continue to hold sway in public opinion. On the one hand are those who want to reduce radicalization to an individual pathology. In this view, people who become terrorists are all mentally ill, have a low IQ, or a personality disorder. On the other are those who ignore the individual altogether and explain away those who become terrorists by purely environmental factors—whether it's poverty, marginalization, or being "brainwashed" by online propaganda.

So radicalization tends to either be seen as caused by individual characteristics or purely social factors. And of course, neither of these depictions are true. We are instead trying to get to the bottom of the interplay between these factors.

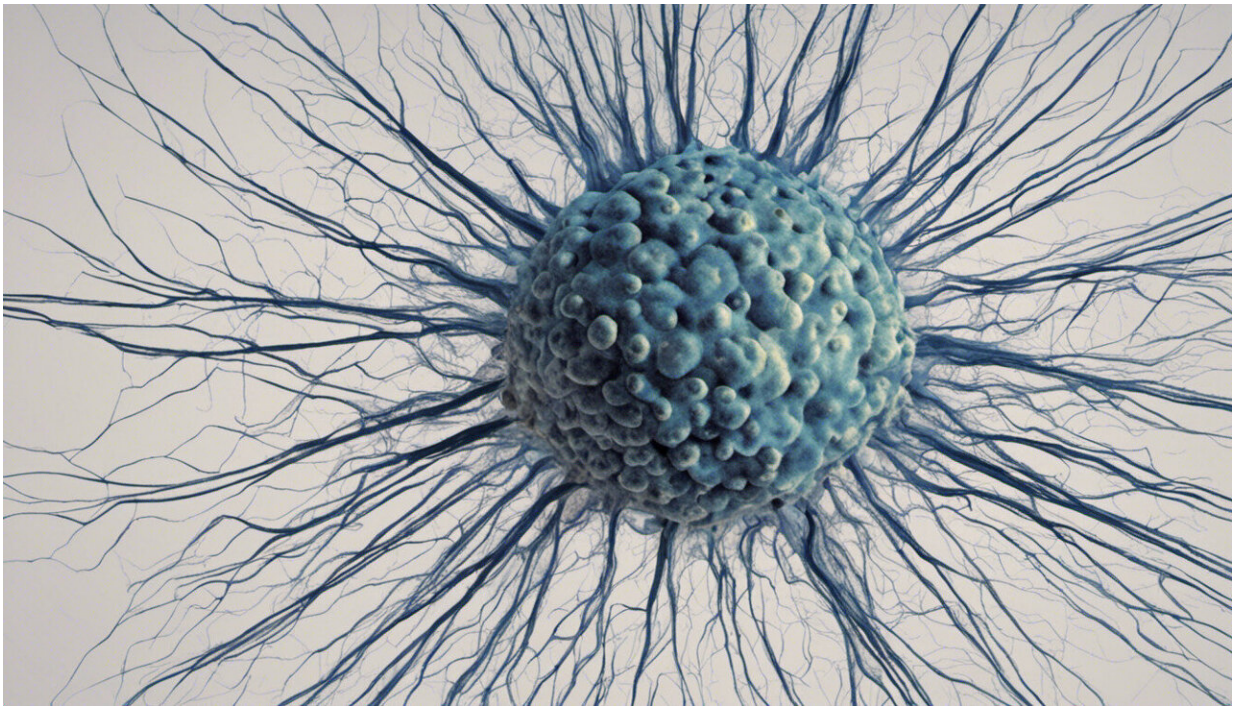
Sacred values

We're part of an international research team, Artis International, that's been studying something called "sacred values" and their role in violent conflicts around the world. Sacred values are moral values that are non-negotiable and inviolable. You certainly wouldn't trade them in for material incentives. Despite the label "sacred," these values don't have to be religious.

For example, most readers would likely consider individual liberty a basic right. If it could be guaranteed that the entire world would experience untold levels of economic prosperity and individual wealth, and to achieve this all we would need to do is enslave a tiny fraction of the world's population, would you agree to it? If not, anti-slavery is a

sacred value for you.

We've studied sacred values across a range of conflicts, from nation states such as Israel and Palestine, India and Pakistan and Iran and the US to sub-state groups, such as Kurdish militias and Islamic State/al-Qaeda. We also looked into non-violent conflicts like the Catalan independence movement. The sacred values that drive these conflicts are those that are perceived as (or actually are) being contested.



Credit: AI-generated image (disclaimer)

From Israel's right to exist, to Palestinian sovereignty, or the future of Kashmir, to the resurrection of a caliphate, when people feel their sacred values are under threat, they muster the will to fight for them. This can happen for both long-held values or new values that people adopt as part

of their radicalization process. These threats can even be as abstract as cultural annihilation. As an imam in Barcelona who was implicated in a thwarted terrorist attack in 2008 told us: "Say what you will about al-Qaeda, the Taliban, or others. If our culture survives modernity, it will be precisely because of these groups."

In the case of radicalization, the adoption of extremist values are concerning enough. But as more of these values become sacred, the propensity towards violence increases and the chance of de-radicalization decreases.

Social exclusion

For our brain scans we used a tool called functional magnetic resonance imaging (fMRI) which records and identifies which areas of the brain are active during specific tasks. Our first fMRI study explored what could make non-sacred values become more like sacred values.

After conducting 535 surveys of young Moroccan origin men in Barcelona, we recruited 38 participants who openly said they would engage in violent acts in defense of jihadist causes. The young men were asked to play "Cyberball," a video game where they and three other young male Spanish players would pass a virtual ball to each other. Unbeknown to them until the debrief, the Spanish players were purely virtual.

Half of these participants were "socially excluded" as the Spanish players stopped passing to the Moroccan players and only played among themselves. The other half continued getting passed the ball. Then, both the excluded and included participants got into the brain scanner, where we measured their willingness to fight and die for their sacred values (for example, forbidding cartoons of the prophet, banning gay marriages) and their important but non-sacred values (women wearing

the niqab, Islamic teaching in schools) which were ascertained beforehand in the surveys.

Unsurprisingly, participants rated higher willingness to fight and die for sacred rather than non-sacred values. Neurally, sacred values activated the left inferior frontal gyrus (IFG) – an area associated with rule processing and previously correlated with sacred values in American university students. But those who were excluded increased their willingness to fight and die for their non-sacred values, and the left IFG became activated even during non-sacred value processing.

In other words, social exclusion made non-sacred values more similar to sacred values. This is an alarming shift as it suggests that social exclusion contributes to making attitudes less negotiable and increases a propensity towards violence. As values become fully-held sacred values, prospects are grim: no research has been able to demonstrate how to de-sacralize them.

Highly radicalised

Even if we can't de-sacralize a value, perhaps we can still pull a highly radicalized person back from the edge of violence. This is what our second neuro-imaging study explored. After surveying 146 Pakistani men from the small and tight-knit community in Barcelona, we recruited 30 participants who explicitly supported al-Qaeda associate, Lashkar-e-Taiba, endorsed violence against the West, endorsed armed jihad and stated they would be willing to carry out violence in the name of armed jihad. These participants were more radicalized than our previous study participants.

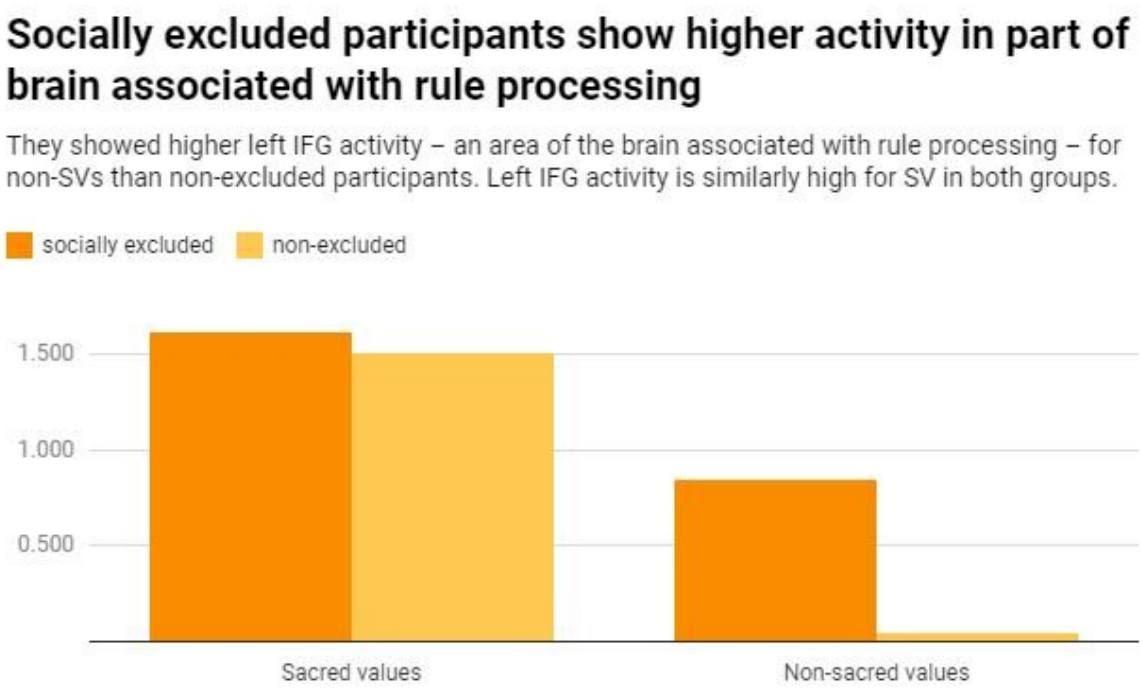
In the first part of the study, they were scanned while rating their willingness to fight and die for their sacred and non-sacred values. These participants showed a different pattern of neural activity from the

Moroccans in our first study, who exhibited the same patterns as US university students.

As the highly radicalized Pakistani men rated their sacred values, there was deactivation in a network that includes the dorsolateral prefrontal cortex (DLPFC), a part of the brain which is associated with deliberative reasoning and integrating cost-benefit calculations. When they rated a high willingness to fight and die for their values, we found increased activation in the ventromedial prefrontal cortex (vmPFC), a part of the brain that is associated with subjective valuation (how much value does this have for me?). In daily life, the DLPFC and vmPFC work in tandem when making decisions.

A follow-up analysis found that these two regions of the brain were highly connected when participants rated low willingness to fight and die—that is, subjective value was regulated by decision control mechanisms. But when they rated high willingness to fight and die, we found that these two regions were more disconnected. This suggests that, when someone is ready to kill and be killed in defense of an idea, they are no longer using decision control mechanisms typically involved in deliberative reasoning.

They essentially disengage this part of their brain. But, their willingness to fight and die lowers as their deliberative and subjective valuation regions reconnect. So what mechanisms bring people to lower their willingness to fight and die for a cause?



Source: Frontiers. Credit: The Conversation

The influence of peers

In the second part of the study, while still in the scanner, the participants were shown each value again with their own original rating but this time they could press a button to see the average willingness to fight and die ratings of their peers. What they weren't told was that these average ratings were an invention and were evenly split between lower, the same, or higher ratings to serve as an experimental manipulation.

When they got out of the scanner they rated their willingness to fight and die for each value again. In post-scan interviews and surveys, the participants stated that they were surprised and even outraged when their peers were not as willing to engage in violence as they were.

Despite this, we found that people lowered their willingness to fight and die for both sacred and non-sacred values to conform to the responses of their peers. This change was correlated with increased DLPFC activation in the brain. Their deliberative pathways were reopening.

The 'normal' radicals

So—what does all this imply as to the various explanations for radicalization often touted?

Let's take the contention that it all comes down to individual characteristics. All the participants in our studies were given a battery of tests from measuring their IQs, to assessing mental illness, to personality scales. They were all considered "normal."

We also found that the idea that radicalization derives solely from social or environmental conditions is flawed. Our studies did not find any relationship between economic factors like poverty and support for extremist ideas or groups. The picture that started to emerge from our research paints a more complicated image—one that has a variety of policy implications.

Our first study suggests that social exclusion can contribute to the hardening of values and increased willingness to engage in violence. This is consistent with other research on social exclusion such as survey findings, which showed that when marginalized American Muslims faced discrimination, they increased their support for radical groups.

But social exclusion does not merely mean the experience of discrimination. Social exclusion is a much broader and more complex phenomenon—a person's feeling that they do not have a seat at the table in their own society.

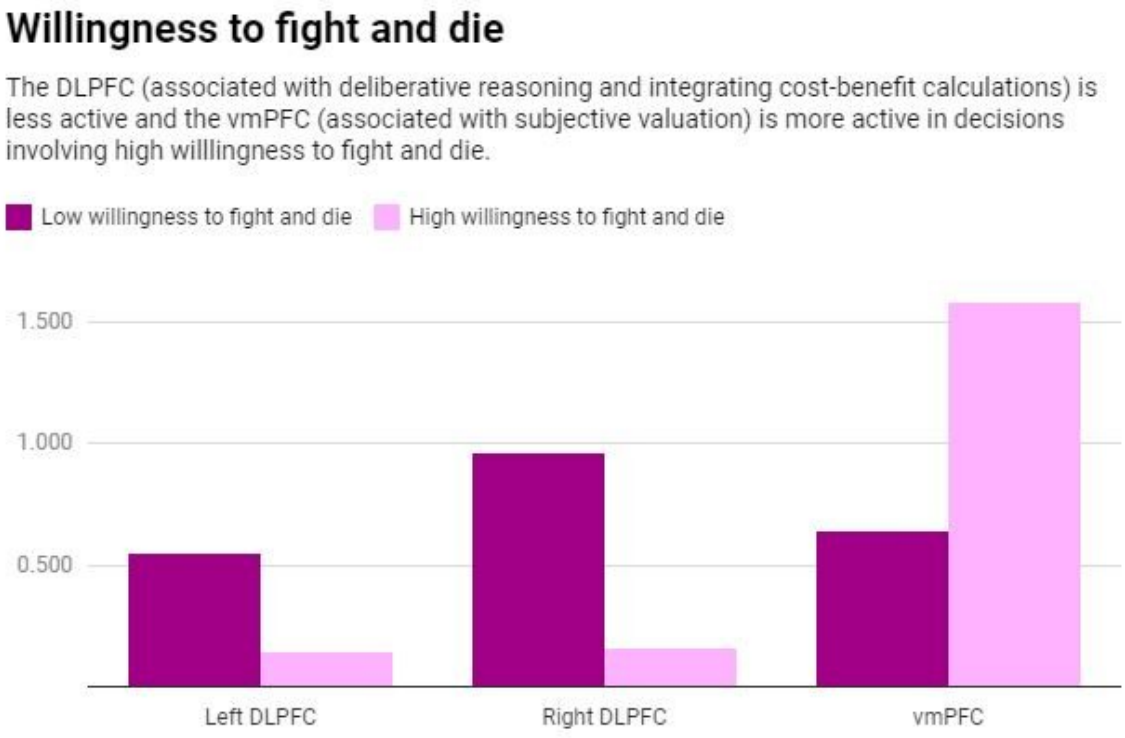
Terrorist groups recruit new members throughout the world by capitalizing on this feeling. Previous research in Syria, Somalia and Nigeria has shown that among the grievances that drive individuals and tribes towards joining terrorist organizations are those of religious, ethnic or political exclusion.

A feeling of not having a voice doesn't lead to radicalization on its own, but rather creates social cracks that local extremist groups can exploit by claiming they are fighting on the behalf of these disenfranchised groups.

Feelings of social exclusion by Sunni Arabs in post-invasion Iraq were an important factor in laying the groundwork for Islamic State's territorial victories. Our research into post-Islamic State Mosul and preliminary investigations into post-Islamic State Raqqa suggests that there were lingering feelings of social exclusion among those who were the most vulnerable to Islamic State recruitment. This will help to lay the groundwork for a resurgence of a similar organization.

Western countries contain marginalized communities who are recruitment targets of both jihadist and extreme right-wing groups. It is in these countries where disenfranchisement is felt particularly strongly because the narratives of these societies are supposed to be based on unbiased access to social mobility and equality.

But in reality, the lived experiences of marginalized communities in the West make them see these claims as hypocritical. Extremist groups exacerbate these feelings with other narratives that polarize them from the rest of society while empowering them with offers of joining a revolution against those who are excluding them. As one British member of Islamic State stated in another of our ongoing research projects: "I had a choice of either selling merchandise for a corrupt system or being part of a revolution against it."



Source: Royal Society Open Science. Credit: The Conversation

All this implies that both foreign and domestic policies that facilitate social inclusion could have a variety of benefits, including stripping violent extremist groups of one of their most exploitable issues.

Counter-messaging

Our research also points to potential problems in mainstream anti-terrorism communications policies. One tool that many governments use is that of alternative and counter-messaging, such as France's Stop-Djihadisme campaign. There are a multitude of such campaigns by civil society organizations that are discretely funded by governments. These

are mostly online messages that attempt to subvert the appeal of extremist groups by, in some cases, prompting self-reflection.

Our research suggests that if areas of the brain associated with deliberative reasoning are disengaged for sacred values, then messages aimed at these issues may not work as intended. In addition, sacred values are unique to the individual. This adds an additional difficulty for mass distributed online alternative and counter-messaging.

Successful radicalisation, even online, usually contains an element of person-to-person interaction. Recent investigations into Western foreign fighters who went to Syria found that 90% were recruited through either face-to-face or online social interaction. No compelling evidence shows that disembodied online messages play a determining role. Radicalisation is a deeply social process that promises a sense of belonging and a purposeful role in social change.

The impulse to become an agent of social change need not be negated. It should instead be re-channelled towards positive ends. So instead of simple counter-messaging, policies should seek to counter-engage by encouraging activities that foster a sense of purpose and belonging.

This is exactly what we're finding in our ongoing research in Belgium into why some youth networks remained resilient to Islamic State recruiters. One of the main differences was how engaged non-radicalised peers were in their communities. They were involved in socially beneficial activities, like youth mentoring, helping the homeless, assisting refugees, or social activism like political advocacy for their own or other communities. While some were still frustrated they nonetheless felt they had the power to effect social change. The greater sense there is of being able to make a difference in the current system, the lower the appeal of violent anti-establishment movements.

Feeling involved

Our experiments indicate that creating inclusive societies that offer pathways to purpose and a sense of belonging to all its citizens has to be a priority in the fight against political violence. Radicalisation is a social phenomenon that must be socially combated with the help of inclusive governance, friends and families, and media.

Policies aimed at disengaging extremists from violent pathways might, for example, benefit from enrolling the help of their non-radicalised friends. Additionally, any strategic communications that can enhance the perception among vulnerable youth that their peers do not consider political violence to be acceptable may help in preventing future breakouts of violent extremism.

The importance of this was highlighted to us by the example of Fahad, a charismatic young man we came across during our fieldwork. Every other week he had a new life goal: becoming an athlete, a scientist, an artist, even a politician. At every turn his conservative parents rejected his ambitions. He soon began to turn inward, spending less time with friends and more time roaming the streets of Barcelona alone.

One day he came in contact with a former acquaintance who was now radicalized. Within weeks Fahad's starry-eyed demeanor changed. Shortly after, he disappeared. His social media accounts and other forms of communication were shutdown.

But the worst-case scenario had in fact not emerged. His parents became aware of his nascent transformation and offered him an alternative: if he worked part-time in a relative's business then he could spend the rest of his time pursuing his career ambitions. As the possibility of a purpose-driven life re-emerged it washed out his flirtation with extremist ideology. In a later communication he told us how well his life was going

and how he finally felt that he "really belongs here."

The process of radicalization remains a complex system that cannot be reduced to the brain, behavior, or environment. It exists at the intersection of these elements. Simplistic explanations that call people "crazy," blame a whole religion or ethnicity, or cast local communities as the villains only obscure practical solutions and provide a recruitment boost to terrorist groups. An inclusive society with pathways to purpose must be an aim for policies that seek to counter violent extremism.

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