

# *The Hidden Epidemic of Brain Injuries From Domestic Violence*

Research shows that survivors of abuse can sustain head trauma more often than football players. But they are almost never diagnosed.



Becky at home in February. She endured two decades of beatings from a boyfriend. Credit...Dannielle Bowman for The New York Times

• **By Christa Hillstrom** March 1, 2022

In 2017, when Becky was about to turn 40, she woke up in the middle of the night and was startled by her reflection in the bathroom mirror. Her face, gaunt from weight loss, looked pale. A scar snaked under her chin from when her boyfriend punched her. Her nostrils were now asymmetrical from when he broke her nose. Smaller scars marked her eyebrows and her bottom lip, where a tooth once cut through. She always wore her hair in a bun to mask a bald spot; he had slammed her head against a door frame, and she had needed staples there. She could barely hear from one ear.

Her chipped front tooth was harder to hide than the broken molars knocked loose during two decades of beatings. When she went shopping, she would hold items in her hands, assessing how much damage they would do to her body. She had stopped buying leather belts, the braided kind. She remembered getting some of her injuries. With others, the memories hung fuzzy and distant.

They met in 1996, when she was a teenager with a new baby. She had already spent years raising her younger siblings when her own mother, who suffered from mental illness and was a survivor of domestic abuse, could not. The first time Becky remembers her boyfriend hurting her, about six months into their relationship, was when he was joking around: a tug on her hair that was surprisingly forceful. Underneath the laughing, something felt mean. And then the meanness got darker.

From the beginning of their relationship, Becky's boyfriend drew the reins tightly around their lives. She could never predict what would set him off. Some days, he attacked her for sleeping too late; others, for waking him up too early. He hit her when the house was too messy or if he wasn't in the mood for the breakfast she made. Becky, who asked to be identified by a nickname for her safety, often showed up to work with bruises on her face, caked over with foundation, but her co-workers never said anything.

She spent whole days strategizing how to avoid his wrath: "How am I going to do all this stuff he wants me to do, so I don't get hit?" "How am I still going to go to work and maintain this job, so I don't get hit?" "How am I going to get to the grocery store and buy the things that he wants, so I don't get hit?"

Her boyfriend never touched her daughter, Nelly. But for years he controlled the child's behavior by hitting her mother in front of her. Nelly, who asked to be identified by her childhood nickname, wasn't allowed to sit on the couch or eat junk food. She never had friends over. If she didn't obey, he beat her mom. In 2009, when Nelly was 14, she asked to live with her dad. In court, her father raised abuse as a reason to revoke custody. Still, no one reached out to help Becky. For years, she barely saw her daughter.

She had long been experiencing headaches and migraines, but by 2017, they had become so bad that she often stayed home from the clothing store she managed. The headaches swelled and subsided like a tide. In bright light, her vision became speckled. Becky began taking Percocet to blunt the near-constant pain, but over time she found herself taking the pills in anticipation of pain — a couple after work when she knew he was in a mood.

When she saw her reflection in the bathroom mirror that night, it was just hours after he had threatened to beat her with a hammer. She thought, *What am I doing?* Nelly, who was by then living in another city, was expecting her own child and would never welcome Becky into their lives if she remained with her boyfriend. Becky wanted to leave but didn't know how. There were nine security cameras surrounding the house, and the windows were screwed shut. When a door opened, her boyfriend received a notification on his phone. But if she stayed, she realized, he would probably kill her.

The next morning, after he dropped her off at the mall where she worked, Becky rushed onto a bus to a friend's house. She disassembled her phone and threw away the SIM card; she was afraid of being tracked, but more afraid of being talked into returning. She took nothing with her. She hid at her friend's house for a few days, and during a snowstorm that closed local roads, she traveled by train across high desert and mountain passes to the city where Nelly lived. She stayed for two weeks, until Nelly gave birth to her daughter, and then fled to Phoenix, where her sister lived. Becky hoped he wouldn't think to look there.

In Phoenix, finding work was difficult. The headaches had become debilitating. She wasn't being hit in the head anymore, but the pain washed over her anyway. She would wake up in the middle of the night, nauseated from it. The ache in her mouth became intolerable, too, so she finally had every molar pulled.

She was also becoming increasingly forgetful. She would walk into a room to do something and then have to backtrack — sometimes several times — to recall why she was there. She lost her train of thought midsentence. After reading passages in a book, she had to reread them almost immediately to remember what they said. It always felt as if a blank wave, a nothingness, crashed over her brain. Life had become quieter, but her mind seemed worse. "When you leave, you think it's going to be great," she says. "And then you're like, Why can't I see straight?"

Nelly noticed the forgetfulness, too. A year after Becky fled, Nelly and her baby joined her in Phoenix. At first they lived out of Nelly's car, and Becky drove her granddaughter around in the Arizona summer, air-conditioner blasting, while Nelly worked. Sometimes Becky and Nelly donated plasma — \$50 each would get them a night at a motel. There were days when only the baby ate. They would eventually save enough money to rent a place in a quiet neighborhood; when Becky told the landlord about her ex-boyfriend, he put bars on all of her windows. Having lived apart from Becky for so many years, Nelly was startled by the way her mom told the same story multiple times, not remembering that she had already shared it, and constantly lost things after stowing them in unusual places.

One night, Becky Googled "domestic violence help" and came across a public-radio story about a local neurologist who treated women whose heads had been repeatedly battered. Dr. Glynnis Zieman worked at the Barrow Neurological Institute's Concussion & Brain Injury Center in Arizona and treated professional athletes for mild traumatic brain injuries, also known as concussions. She also treated women like Becky.

As she read, Becky was grateful for finally having a way of understanding what was happening to her. But she felt a deep dread too. "It dawned on me: Holy, like I've probably been hit way more times than the average football player," she says.



An exam room at the Barrow Neurological Institute's Concussion & Brain Injury Center in Arizona. Credit...Dannielle Bowman for The New York Times

***Brain injuries are like*** earthquakes. In a major quake like the one in San Francisco in 1906 — say, a severe brain injury involving fractures, hemorrhages or penetrating wounds — bridges go down and buildings collapse. The city is devastated. But mild brain injuries are smaller quakes: Books fall off shelves; vases are broken. It's harder to survey the damage and easy to miss what's broken, but something is clearly wrong.

The danger of mild brain injuries — an impact on or a shaking of the head that alters consciousness — grew in public awareness in the early 2000s, when neurologists began examining the brains of deceased football players and other former athletes and noticed a spike in traumatic brain injuries among military veterans returning from Iraq and Afghanistan. In 2015, the [N.F.L. reached a settlement with thousands of players](#) for head injuries they received during games, with potential payouts that could cost the league \$1 billion in the coming years. Researchers showed that even slight blows to the head, when repeated often enough, could result in long-term neurodegenerative disease. These discoveries led to improved safeguards for athletes, including better health care and protocols for preventing and treating concussions. Head injuries had to be fully evaluated by doctors before players returned to the game, ensuring that the brain could heal without further damage, a process that sometimes takes days, weeks or months.

But even with this heightened awareness, few connected the experiences of women who endured similar or even higher levels of bodily violence to traumatic brain injuries — not even in the shelters to which they fled. “People might think, Someone smacked her in the head or pushed her, no big deal,” says Eve M. Valera, an associate professor of psychiatry at Harvard University and a leading researcher on traumatic brain injuries

among survivors of domestic violence. While brain injuries among this population have never been comprehensively tracked, data suggest that the rate might be significantly higher than those incurred by athletes or soldiers. The Centers for Disease Control and Prevention estimates that one in five women in the United States experience severe intimate-partner violence over the course of their lifetimes, resulting in physical injuries, most commonly to the head, neck and face. Concussions are likely to appear with alarming regularity. Every year, hundreds of concussions occur in the N.F.L.; thousands occur in the military. Valera's estimated number of annual brain injuries among survivors of domestic abuse: 1.6 million.

But unlike injuries in sports, war or accidents, domestic assaults happen almost entirely out of view. Victims themselves may not be able to process or remember what happened, and their assaults are often not reported to the police. When Valera was a graduate student in psychology in the mid-1990s, she volunteered at domestic-violence shelters, where she heard stories about women whose heads were pummeled with

baseball bats and work boots. *There's no way these women aren't sustaining traumatic brain injuries*, she thought. But when she looked for research on the impact of head injuries in women in general, she found that most research had been conducted on men. "We can't just generalize based on what we know about males," she says. Men and women have different hormones coursing through the brain; even the architecture of their neurons varies. When it came to domestic-violence brain injuries specifically, the literature seemed to consist of only a brief letter to the editor of *The Lancet* from a British doctor named Gareth Roberts.

In 1990, Roberts was teaching neuroanatomy at Imperial College London with one of the world's leading groups investigating Alzheimer's. A colleague requested his assistance evaluating the autopsy of a 76-year-old woman who died after years of abuse from her husband. The letter described rib fractures, bruises and abrasions to the head. She had a history of stroke and, it was reported, had become "demented" in her later years — mostly in the form of memory loss and confusion.

What Roberts found in her brain was similar to what he saw in brains with Alzheimer's — tangles of tau and beta amyloid proteins associated with neurodegeneration. Her autopsy revealed a brain that had deteriorated to a degree comparable to boxers suffering from chronic traumatic encephalopathy, or C.T.E., once known as "punch-drunk syndrome." It was the first time the literature had connected abused women with neurodegenerative disease.

Around the time Valera completed her dissertation on this topic, other studies started appearing. In 1999, researchers at SUNY Stony Brook published a study in which they examined the case records of 26 women at a shelter and found that [more than one-third of them reported head trauma](#). Most of them had been punched in the head. One had been hit with a broom handle, another stabbed in the head, another knocked out by a car door, another run over. All nine women reported symptoms like dizziness, hearing problems and blurred vision. Some developed seizures or strokes, which can surface years after strangulation. (Strangulation can inflict anoxic and hypoxic injuries, which

occur when brain cells are damaged by oxygen deprivation.) Some also suffered from confusion, fatigue and memory loss.

A similar [study of domestic-abuse survivors from 2002](#) found that nearly all respondents had been knocked in the head, with 40 percent of them losing consciousness. “The frequency and severity of symptoms reported here would make it difficult to think through or cope with the complex, often formidable organizational tasks required for battered women to stop the violence, disengage from violent partners and/or establish independent lives,” the authors wrote. They recommended that anyone who worked closely with these survivors bear these difficulties in mind to help contextualize frustrating behavior and emphasized that neurological disease may not be resolved with psychosocial interventions. The next year, in another study, Valera surveyed 99 women recruited from domestic-violence shelters: Nearly 75 percent of them had sustained at least one brain injury, including from strangulation. A majority never sought medical attention.

“The connection between partner abuse and brain injuries seemed so obvious, but I was nonetheless startled by the results of my subsequent investigation,” [Valera wrote 15 years later, in 2018, in a retrospective in The Journal of Women’s Health](#), noting that there had not been as much progress as she hoped when she first discovered what she called an epidemic.

All these studies demonstrated an almost total lack of information about the problem’s scope, much less how to treat it. The blind spot was catastrophic: an invisible population plagued, en masse, by invisible injuries that went untreated and unstudied for decades. “I don’t think people think of a woman with a brain injury the way they would think about a quarterback on a football team,” says Katherine Snedaker, the founder of the nonprofit Pink Concussions, which promotes research and advocacy for women with brain injuries. “When violence around us, on some level, is acceptable for some people, then it’s going to take time.” In 2017, Snedaker, along with Valera, began inviting doctors, researchers, advocates and others to share their work on domestic violence and brain injuries. The group grew to more than 300 members when pandemic-related stressors contributed to a spike in domestic assaults worldwide. Victims themselves began reaching out, too.

One woman, Freya, who is now in her 50s, called Valera in 2017 after reading an article about her work. Freya, a name she uses when speaking publicly for Pink Concussions, married her high school sweetheart, an alcoholic, after moving in with him when they were teenagers. “I’d had my head slammed into doorjambs, been strangled, thrown off a porch, had my head beaten into the ground, chased down the street with a shotgun,” she told me. Years after she finally left him, she noticed she was forgetting words in the middle of sentences. She couldn’t read for more than a few minutes without losing the thread. Freya had heard about the football players, but before talking to Valera, she had never made the connection. She thought she had early onset Alzheimer’s in her 30s.



Freya, who thought she had early onset Alzheimer's in her 30s. Credit...Dannielle Bowman for The New York Times

*When Becky walked* into the lobby of Barrow's Concussion & Brain Injury Center in late 2018, she noticed that the TVs were showing football games. An autographed poster of the Phoenix Suns hung across the hall from a wide-angle shot of Arizona State's Sun Devil Stadium. Throughout the clinic were trophies, balls and jerseys signed by Grant Hill and Shaquille O'Neal. Sometimes new-patient interviews were conducted in a room with a panoramic aerial photograph of the 2015 Super Bowl to remind patients, whoever they were, that they were about to receive the same care as N.F.L. players.

Two floors beneath the concussion clinic, in an airy gym filled with therapy balls, pulley systems and foam rollers, women and other brain-injury patients worked with physical and occupational therapists and speech-language pathologists who led them through exercises that rebuild cognitive skills and physical abilities. (Roughly 95 percent of Barrow's domestic-violence patients are women.) In one room stood a boothlike machine that assessed vision, dizziness and vestibular damage while patients balanced on a swaying platform between moving walls. Many patients with traumatic brain injuries struggle with blurred or double vision, or lack depth perception, because brain injuries can disrupt neural pathways that control eye movements. Eyes that are misaligned, or that move too slowly, are at the root of problems ranging from memory to mood; when patients are overwhelmed with visual stimuli, the eyes may not be able to keep up. Re-coordinating the eyes is often a significant step toward healing other problems.



Upstairs in the clinic, Ashley Bridwell, a social worker who conceived of the program for survivors of domestic violence in 2012, guided patients through daunting to-do lists. Many have left their abusers and are trying to rebuild their lives, which requires them to wade through the symptom-triggering paperwork of applying for Medicaid, food stamps, subsidized housing and jobs. Some are dealing with custody disputes, restraining orders or criminal prosecutions of their abusers in court. The very symptoms that could be proof of neurotraumatic abuse — scrambled stories, irritability, memory gaps — cast doubt on their credibility.

**Sign up for The New York Times Magazine Newsletter** The best of The New York Times Magazine delivered to your inbox every week, including exclusive feature stories, photography, columns and more. [Get it sent to your inbox.](#)

Becky was directed to an exam room, where she met the doctor she had been reading about. Becky told Glynnis Zieman about her fatigue, the immobilizing headaches she suffered almost every morning, as well as the more severe migraines, sometimes accompanied by vomiting and emergency-room visits, that descended on her when she stood up too fast, blinked into bright light or became overstressed, or that showed up for no reason at all. Zieman examined the way Becky's eyes tracked an object moving steadily toward her and walked her through a questionnaire used to diagnose traumatic brain injury.

Before Phoenix, Becky hadn't been to a primary-care doctor in 20 years because her boyfriend would not allow it. When she finally ventured to medical clinics after she fled, her symptoms were dismissed. She was told to take ibuprofen for her migraines — her history with Percocet made doctors wary of prescribing anything stronger. Many looked skeptical when she told them how many years her boyfriend had hit her. They didn't understand how hard it had been for her to leave, that the fog she lived through felt like day-to-day survival. "When you've got somebody second-guessing you, it almost makes you feel like, God, am I crazy?" she says. She wasn't sure Zieman would find anything physically wrong with her.

Instead, Zieman told her that her brain was not functioning normally and that together they would figure out what to do. When Zieman asked how many times she had been hit in the head — five, 10, 15, more? — Becky initially thought she meant per day, not over the course of her life. "To be honest, there were some days that would have been five to 10 to 15 to 20," she says. "Every day was different."





Dr. Glynnis Zieman in her office at the Barrow center. Credit...Dannielle Bowman for The New York Times

Zieman asked if she had been strangled (yes) and whether she lost consciousness (she thought so). Becky left her first appointment with a diagnosis of multiple traumatic brain injuries and a plan: Zieman recommended a range of therapies, including psychotherapy, occupational therapy and speech cognitive therapy, and Becky and Zieman would meet regularly until they had successfully treated the headaches and migraines.

Becky had two M.R.I.s, first to check for permanent damage, which she did not have, and then to check for elevated pressure in the fluid around the brain, which she did. She also tried several medications over the course of the first year; all of them helped stem the migraines, but nothing blocked the throbbing headaches that came most mornings. Then Zieman tried Botox injections along Becky's forehead, the sides and back of her head and on her shoulders to block neurotransmitters that carry pain signals from the brain. It felt weird at first — Becky couldn't wrinkle her forehead — but she also felt immediate relief. "I woke up the next day, and then I kept waking up and waking up, and then realizing, Oh, my God, it's been two weeks since I've had a headache," she says. "It was almost instant, and it stayed." Becky continued the injections until she became pregnant in 2019.

The headaches returned during that break, but they were less frequent and easier to tolerate. The forgetfulness was still alarming, but she knew she had access to help. The calm of her new life, with entire days spent in her dimly lit, quiet apartment, had smoothed out her symptoms. But she also knew they could flare up under stress and

overstimulation. On one of these occasions, last June, her baby had a bad fever, and Becky rushed her to the emergency room. There were forms and questions and grating beeps blaring from the monitors while the baby wailed on the bed. The lights above were a brash fluorescent, the worst kind for a person with a brain injury. In the emergency room, Becky felt pressure mustering behind her temples and forgot some simple words. “I need to know my ...” she trailed off for several seconds. “Choices.”

*Almost everything* we know about concussions and neurodegenerative disease comes from studying male brains. But some of the research we do have, mostly on athletes’ brains, suggests that women may be more vulnerable to concussions than men. Concussions jostle the brain’s gelatinous mass of neurons, disrupting circuitry that affects mood, function, thinking and more. Men tend to have more muscular necks that better cushion acceleration of the head. There are anatomical differences between male and female axons, too. Women’s axons — nerve fibers that unfurl between neurons to form communication networks — have a generally leaner architecture that could shear more easily during trauma. Successive concussions may tear them, releasing tangles of tau protein into the brain. But the differences are more than mechanical.

When Ramesh Raghupathi, a professor of neurobiology and anatomy at Drexel University College of Medicine, began studying concussions in female rats, he immediately noticed differences from those of males. The cellular changes looked similar, but functionally, the rats experienced different outcomes: The females experienced more intense anxiety and depression. “It had to do more with the circuitry and neurochemistry of the female brain compared to the male brain,” he says. “You cannot discount the role of sex hormones.”

In a 2014 study, researchers found that [women of childbearing age experienced worse post-concussive symptoms than postmenopausal women or women taking hormonal birth control](#), especially when the concussion occurred during the luteal phase of the menstrual cycle (after ovulation, before the period begins). Progesterone levels are high during this time, and one theory is that progesterone disruption, perhaps caused by harm to the pituitary gland, could have an especially harsh impact on neurons. In other words, where a victim is in her menstrual cycle at the time of impact could have a significant effect on the outcome of her traumatic brain injury.

A study published last year analyzed [female athletes during the immediate aftermath of concussions](#). Researchers measured levels of progesterone and noted menstrual phases at the time of injury. Their results were consistent with the association of progesterone disruption and poorer outcomes, though more data is needed to understand why. (An estimated 31 to 50 percent of transgender people experience intimate-partner violence, with higher numbers for transgender women, but no studies have analyzed the impact of brain injuries in this group.)

“So much money goes into investigating concussions in sports that those protocols and papers go on to shape the way concussions in general are thought about,” says Stephen Casper, a historian of neurology at Clarkson University. “There’s no money to be made

from studying intimate-partner abuse.” When it comes to chronic neurodegenerative diseases like C.T.E., even less is known about what women may face after decades of abuse. Slight acceleration or shaking of the brain that doesn’t register as a concussion may, if repeated frequently enough, trigger a cascading, dementia-like disease process that continues years after the trauma stops and is discovered only through postmortem examination.

At the VA-BU-CLF Brain Bank in Boston, the world’s first C.T.E.-focused brain repository, Ann McKee, the director, has collected around 1,250 specimens. Her findings have helped change the way football is played and has helped move hundreds of millions of dollars toward victim compensation, pushing the neurological hazards of contact sports squarely into public consciousness. But 14 years after the bank’s founding, nearly all of its specimens are still male. Female brains, McKee says, are hard to find, especially from women like Becky. “When you’ve got an interpersonal-violence situation, you have to get permission from the next of kin to get a brain donation,” she says. Domestic violence carries a shame that can be hard for families to confront, and if the next of kin is the abuser, there’s virtually no chance.

Last year, Travis Danielsen, then a medical examiner in Colorado Springs, published the first documented [examination of degenerative brain disease in a domestic-violence victim](#) in more than 30 years. In 2019, he examined the body of 29-year-old Jeanette Ellingson, who had so many injuries that he couldn’t isolate one as the cause of death. Ellingson was covered head to toe in wounds: abrasions, cuts, scrapes. Her ribs were fractured, her lungs were bruised and she had hemorrhaging underneath her skull. There were also more than 20 scars on her scalp from previous injuries. Her fiancé, Donnell Desmond Bradley, told the authorities that she fell in the shower. (He was sentenced to life in prison last year for her murder.)

Danielsen, who previously worked on C.T.E., grew suspicious when he saw those older scars. He examined Ellingson’s brain but saw no visible injuries. He submerged it in formaldehyde for two weeks, until it was firm enough to slice and stain. The immunohistochemical stain that colors tau protein helped Danielsen see the invisible: tau staining around the blood vessels in a distribution characteristic of a C.T.E.-type pathology. As a forensic-pathology fellow, he had seen this pattern many times before, including in the brain of a former college football player who committed suicide. “This case comes in on a day when I’m not assigned to do autopsies, I doubt the brain gets saved,” he says. “I know the brain would not have been evaluated for C.T.E.”

Such finds are uncommon, and not even Ellingson’s brain can be studied in a brain bank. It must be saved as evidence in case her fiancé appeals his conviction.

***Before seeking*** treatment at Barrow, Becky, and the few doctors she had gone to, attributed her symptoms — the headaches, the shaking, the blankness — to post-traumatic stress disorder, a common, if incomplete, diagnosis. PTSD shares many nearly indistinguishable symptoms with traumatic brain injuries, and research suggests that roughly 65 percent of domestic-violence victims may experience it. But much of the

research on PTSD has overlooked comorbid brain injuries. “You could treat that PTSD for a long time and not have a person who comes out functioning better, because they have a brain injury that hasn’t been recognized and diagnosed and treated,” says Danielle Eagan, a Barrow clinical neuropsychologist. Many victims have gone through years of psychotherapy only to hit a wall.

In 2015, Karen Mason had been helping women navigate PTSD as the executive director of Kelowna Women’s Shelter in British Columbia. She understood trauma. For a great many of the women who came to the shelter, abuse didn’t explode in one violent encounter — it was chronic, often beginning in childhood. She was accustomed to witnessing mood swings (irritability or antagonism) and cognitive impairments (forgetting appointments or curfews, not being able to follow rules correctly), which she and her staff associated with PTSD. But it wasn’t until Mason started dating Paul von Donkelaar, a neuroscientist then studying sports concussions, that it occurred to her that those women must also be suffering from something else. “I thought about all the clients who might come across as oppositional or difficult and realized, What if they’re just dealing with effects of a brain injury?”

The following year, Mason and von Donkelaar started a research initiative, SOAR (Supporting Survivors of Abuse and Brain Injury Through Research). Part of their work draws on the expertise of survivors, including a woman in her late 30s who had recently fled from the last in a string of abusive partners: One strangled her until she managed to shove him off, then he smashed her head against a night stand; another pushed her out of a moving car, cracking her skull. Years later, she noticed unexpected shifts in her personality. She had become easily irritable with her child and had to plaster her kitchen with Post-it notes just to remember how to make breakfast. She started practicing yoga and prayed to ease symptoms but did not fully understand what was happening to her until Mason told her about brain injuries. “I’m not this monster because I get angry really fast,” she told me. “I had been so hard on myself as to why I could not do certain things.” She went on, “Everybody’s like, ‘Oh, it’s PTSD, it’s the aftermath.’” But it was more than that.

While advocates are beginning to recognize the full scope of trauma that abuse survivors are living with, little is known about how the combined presence of PTSD and traumatic brain injury might affect the brain. In January, Catherine Fortier, the deputy director of the Department of Veterans Affairs’ Translational Research Center for T.B.I. and Stress Disorders (TRACTS), found [alterations in brain structure and function among abuse survivors with a history of brain injuries and PTSD](#). Notably, women whose brain injuries were sustained in the context of domestic violence displayed decreased cortical thickness and impaired function in the frontal limbic system, which may cause poor impulse control and difficulties with regulating emotions. “The T.B.I.s that occurred in those violent relationships, that occurred in a psychologically traumatic context, showed more pronounced changes than the T.B.I.s that occurred in a regular civilian-type accident, like a sports injury or motor-vehicle accident,” she says.

Researchers are also starting to grapple with the impact of multiple simultaneous injuries, which are common among abuse survivors and combat veterans. “The thinking

has been that the way you study concussion is you isolate it as if it occurs in a vacuum,” says Bill Milberg, co-director of TRACTS. But what happens, for instance, when a punch in the head is followed by prolonged strangulation? (According to the C.D.C., an estimated 10 percent of all women in the United States experience strangulation, but it is often overlooked in studies and rarely screened for in emergency rooms.) Oxygen deprivation can kill neurons, yet we don’t know how that affects concussions.

Like those of PTSD, the symptoms of anoxic and hypoxic injuries often resemble traumatic brain injuries: cognitive deficits, impaired memory, mood alterations. In January, Eve Valera of Harvard published a study that measured how strangulation impacted cognitive function and found that women who had lost consciousness or become disoriented after being choked performed worse on tasks related to long-term and working memory. She also found higher levels of symptoms consistent with PTSD and depression. “This wasn’t really ever looked at before,” Valera says. And researchers still don’t know what happens when those injuries interact with traumatic brain injuries.



Paula D. Walters with a picture taken the night she was punched and strangled by her boyfriend in 2006. Credit...Dannielle Bowman for The New York Times

When Paula D. Walters founded a nonprofit in Ohio for domestic-violence education in 2015, she was unaware of the damage of combined strangulation and multiple traumatic brain injuries. She had been in an abusive relationship herself. One night in 2006, she and her boyfriend returned from a night celebrating with co-workers from the hospital where she worked as a paramedic. She remembers that they argued after he accused her of flirting. In a police report and medical records, she described how she was thrown to the ground, punched, spat on and choked. Walters was treated at the emergency room but did not receive a brain scan.



Over the years, she started noticing cognitive and behavioral problems she had never experienced: She had trouble remembering things and concentrating on her work; she was irritable and short-tempered, hypersensitive to light and noise and could no longer sleep through the night. She even lost her balance while walking, catching herself on the wall. Her symptoms, which she thought were a result of PTSD, continued to worsen, and by 2016 she could no longer work as an E.M.T. She lost her insurance and racked up tens of thousands of dollars in medical debt. She grew deeply depressed and began preparing a will, telling her family she was considering killing herself. “I felt like I’m slowly dying, and no one could figure out why,” she says.

Then in 2017, struggling to focus, she rear-ended another car. This time, doctors ordered an M.R.I., which revealed an extensive die-off of brain cells as a result of her strangulation. She sought treatment at a neurology center in Minnesota, which has helped ease her symptoms, though the damaged neurons would never be fully regenerated. By 2021, Walters had testified multiple times to the Ohio Legislature in support of bills that would classify nonfatal strangulation as a stand-alone felony. (Ohio and South Carolina are the only two states without such laws.) Walters’s ex-boyfriend was convicted of attempted aggravated menacing not long after the assault (he pleaded no contest) and was given probation and a \$500 fine. To this day, Walters struggles with brain fog and balance when she becomes stressed. Of her attack, she says, “I got a life sentence that night.”

*In September*, Becky received her medical records for the first time. During the summer, she had called every hospital in her hometown to try to track them down. Someone at the first hospital she called asked whether she had ever visited the emergency room there. Becky said she thought so, and when the woman looked up her name, she sighed, “Oh, yes.”

For weeks, Becky let the files sit in her inbox. “I know that those things have happened to me,” she said about her injuries. “But I forgot how it happened.” Finally, she opened one PDF alongside her therapist. (She let the other files sit in her patient-portal inbox until they expired and disappeared.)

That PDF included 40 pages documenting nearly a dozen visits to a single hospital, most of them related to abuse that was never identified as such. Becky went in only when she was seriously bleeding, breaking out in stress-related hives or had intolerable pain, and she always lied about how she got hurt. In 2009, she told doctors she tripped and struck her head against a wall, causing a three-inch laceration, which was actually caused by a marble ashtray her ex-boyfriend flung at her head. In 2012, she needed stitches on multiple wounds because, she claimed, someone was swinging a weed whacker around, dislodging the battery and reeling it into her face. In 2014, she told them she sustained multiple injuries from falling down the stairs when the power went out. She remembers telling another hospital that she fell while making cupcakes, her feet tangled in an electrical cord. The more details she included, she assumed, the more believable her stories would sound.

In the records, doctors observed that she was “pleasant” and “cooperative.” They believed she fully recalled what happened to her and never lost consciousness. Neither was true. “How many people in two years need to come in and get stitches in both eyes or in their lip and their chin and in their forehead, you know, before somebody is like ... Are you sure you’re OK at home?” she said. “Right there should be a sign that something is going on, you know, something is wrong.” Many hospitals have access to social workers, liaisons with law enforcement and social services and, sometimes, forensic nurses who can document injuries as evidence. In all her emergency-room visits, Becky says she was never offered those resources.

In 2020, the Government Accountability Office released a report warning that the [lack of data-gathering on traumatic brain injuries in abused women makes it impossible to confront the crisis in a meaningful way](#). Investigators identified only 12 nonfederal initiatives nationwide that provide education, screening or treatment for brain injuries in this population. Among them were law-enforcement, advocacy and health care organizations whose frontline employees are the few people victims have contact with outside their homes. In the Phoenix area, for example, the Maricopa County Collaboration on Concussions in Domestic Violence connects shelters, law enforcement and research institutions. Officers from the Tempe and Mesa Police Departments are trained to administer on-site eye-convergence tests to detect concussions and can take victims to a forensic nurse, who treats and documents criminally inflicted injuries. Jorge Lomeli, a sergeant on the Tempe Police Department’s domestic-violence unit, says the trainings taught everyone, from beat cops to detectives, that women displaying inconsistency, hostility and bewilderment aren’t necessarily being uncooperative. “It could be because they’re actually injured, that it’s not a visible injury,” he says. “You have to realize that potentially inside their head, they’re trying to tell you a story, but it’s just not coming out.”

Of the 12 nonfederal initiatives, only two provide medical care — Northside Hospital Duluth Concussion Institute in Georgia and the Barrow center in Arizona. Rachel Ramirez, the founder and director of the Center on Partner-Inflicted Brain Injury at the Ohio Domestic Violence Network, said she receives several emails a month from women who believe they have traumatic brain injuries but struggles to find the best place to send them. “There’s not the Brain Injury Doctor” to refer people to, Ramirez says. “It’s amazing work they’re doing,” she says of the Barrow center. But, she adds, it’s work that exists almost nowhere else in the country.





An occupational therapist demonstrating an eye-coordination exercise at the Barrow center. Credit...Dannielle Bowman for The New York Times

In 2019, the National Institutes of Health began funding a study using brain imaging and other tools to understand the health impacts of traumatic brain injuries on domestic-violence victims, and this year the C.D.C. plans to begin collecting data on traumatic brain injuries and strangulation through its continuing National Intimate Partner and Sexual Violence Survey.

Reviewing her medical records revealed to Becky the macro story of her abuse behind the sunny excuses she devised. “Looking at that paper just showed me how intense it was,” she says. “Imagine the things I don’t remember.” The brain-injury diagnosis helped Becky recognize a host of other physical ailments and freed her to seek help with them too. She has since been diagnosed with fibromyalgia, irritable bowel syndrome and herniated discs that led to spinal surgery. Her doctors believe that all of it could have stemmed from the abuse.

She recently started having dreams about her ex-boyfriend. In them, he’s always out of focus, haunting the periphery. She’s trapped there as if in a time loop, her brain frantically figuring out how to escape. Most days, she wakes up around 3 a.m. She believes that this was the hour her own mother was attacked in their home by an ex-boyfriend who broke in. Becky was only 8 when she saw her mom get struck in the head with a pistol, breaking her eardrum. Now Becky thinks her mom probably suffered multiple brain injuries herself.

Becky's room is splashed with soft turquoise. It's a color that feels tranquil as she brews her early morning coffee and settles upright in a spot wedged between her baby and her granddaughter. Both of them end up in her bed each night. She uses these hours to think and cry. She remembers the things that have happened to her. She cries about the pain that Nelly endured every year Becky didn't leave.

For decades, Becky calibrated her actions to her ex-boyfriend's frightening mood swings, conforming herself to his likes and dislikes. Awake at night now, she centers on what she's learning to be true. She likes sour cream, which she was never allowed to eat. It's OK to have dirty dishes in the sink. And she did what she could to be a good mother.

In January, Becky started taking classes at a community college — including psychology, behavioral health and interpersonal communications. She hopes to get an associate degree in social work. Someday, she wants to build a career out of helping other women like her. Before her traumatic brain injuries, she had excelled at school. Now she and Nelly have charted out systems and apps to help her manage her schoolwork.

After she began her concussion treatment, Becky started getting tattoos. Her skin, once purpled over with bruises and crossed with stitches, is now spiraled and etched with lines she finds beautiful. On one forearm is a spidery script saying, "Never look back." On the other, "Forever free." On her upper arms are the names of her daughters, a lion nestled among flowers and a broken clock, frozen on the date she left.



Becky's kitchen, where she can now leave dirty dishes in the sink without fear. Credit...Dannielle Bowman for The New York Times

---

***Christa Hillstrom*** is a Seattle-area writer and the recipient of a New York Press Club Award. ***Dannielle Bowman*** is a visual artist working with photography. Her work is currently featured in “Family Album,” an exhibit at the Los Angeles County Museum of Art focused on the family lives of artists of color.