Why So Many Seniors Get Swindled
Brain Anomalies and Poor Decision-making in Older Adults

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The elderly often fall victim to scams, but is it more than aged neurons causing the problem? One expert argues that such slips result from gene-based abnormalities in the brain’s emotional processing rather than the normal deterioration that goes with aging.

“You won’t believe what happened!” an elderly man said to his son. The father had received a telephone call informing him that he had won a large prize. To collect it, all he had to do was wire $4,000 to a Guatemalan bank. He had wired the money before he called his son.

A few days later and several states away, a “nice man” knocked on an older woman’s door and offered to repair her storm-ravaged roof for $6,000. Without verifying his identity, she handed him a check.

Although decision-making abilities often decline as we get older, Natalie Denburg argues that we should not consider such deficits to be a part of “normal aging.” Nor are they likely signs of a dementia such as Alzheimer’s disease. Denburg’s research suggests that some older adults experience flawed emotional responses that stem from abnormalities that develop in the brain’s prefrontal cortex. Further research could help identify and protect people who are especially vulnerable to being swindled.

Deceptive and fraudulent advertisers, telemarketers and door-to-door salespeople are notorious for targeting older adults. Stories of vulnerable people losing their money, and their sense of dignity, shock and sadden us.
We do not wholly understand why elderly people are vulnerable to such schemes. Although possible explanations range from loneliness and gullibility to memory impairment and dementia, these characteristics do not accurately describe many of the victims. For example, some older adults have provided cogent congressional testimony in which their ability to describe their experiences with multiple scams does not give any evidence of memory impairment or generalized dementia.

Instead, studies using brain imaging suggest that a subset of older adults who have no diagnosable neurological or psychiatric disease may experience disproportionate, age-related decline in specific neural systems crucial for complex decision-making. New functional neuroimaging findings, along with results from behavioral, psychophysiological and structural imaging studies of the brain, indicate that these seniors may be losing their ability to make complex choices that require effective emotional processing to analyze short-term and long-term considerations. Older adults in this category fall prey to the promise of an immediate reward or a simple solution to a complicated problem. They fail to detect the longer-range adverse consequences of their actions. Finally, they may assume long-term benefits in situations where there are none. We see these characteristics as direct consequences of neurological dysfunction in systems that are critical for bringing emotion-related signals to bear on decision-making.

Could an older adult who makes poor choices be in an early stage of Alzheimer’s disease or at greater risk for developing the disease? Although we cannot definitively answer the second part of this question, our studies indicate that isolated impaired decision-making among older adults is a discrete phenomenon. It is distinct from Alzheimer’s in terms of the brain regions affected, the course and progression of the syndrome, and the likely brain abnormalities involved. Furthermore, its clinical symptoms appear to be far more subtle than those of a dementia.

While researchers must pinpoint the causes of decline in decision-making ability in more detail, we believe that health care professionals and family members can help to identify potential victims and to take preventive measures now.

“Healthy” but Vulnerable

There are many theories on how a “healthy” brain ages. Some of these ideas contradict conventional wisdom, which holds that aging is synonymous with memory loss. Although the human memory does tend to deteriorate modestly with age, many older people experience far more dramatic declines in cognitive abilities that are not related to memory, such as concentration, problem solving and decision-making. Unlike the
ability to remember, which scientists have linked to the medial temporal region of the brain, these other abilities are closely associated with the frontal lobes.

A recent theory called the frontal lobe hypothesis\(^1\) proposes that some older people have disproportionate, age-related changes of frontal lobe structures and the cognitive abilities associated with those structures. Several sources of evidence, including neuropsychological, neuroanatomical and functional neuroimaging studies, support this theory.

Following up on the frontal lobe hypothesis, our team of scientists at the University of Iowa has proposed that some older adults are vulnerable to fraud because they experience disproportionate changes in certain areas of the anterior portion of the frontal lobes. These areas include the ventromedial prefrontal cortex, a vast expanse of highly evolved brain tissue. Along with scientists from other laboratories, we have demonstrated that damage to this subregion—due to stroke, tumors or other injuries—can cause dramatic changes in personality and higher-order abilities: reasoning, judgment, decision-making and emotional processing.

Our observations have led to a theory of how the prefrontal region influences certain aspects of higher-level cognition: the somatic marker hypothesis.\(^2\) The term somatic refers to body- and brain-related signals, which we experience as emotions and feelings. According to the somatic marker hypothesis, we make choices that are in our best interest only after we effectively weigh potential short-term and long-term outcomes. A key idea of this hypothesis is that when a decision’s outcomes are ambiguous or uncertain, a person’s emotions and feelings are essential to making a decision.

The ventromedial prefrontal cortex is critical in triggering various bodily changes (somatic states) in response to stimuli such as cues for reward (a positive outcome) or punishment (a negative outcome). Another area that participates in this process is the insular cortex, where such bodily changes are represented in the brain. As we make decisions in uncertain conditions, our assessment of immediate and future potential consequences may trigger numerous conflicting responses. For example, a highly favorable potential consequence may trigger excitement and elation, while an unfavorable consequence may trigger pain and dread. The result, however, is the emergence of an overall positive or negative signal—basically, a message of either “go” or “stop.”

We propose that the brain may trigger numerous and conflicting signals
simultaneously, but sooner or later, stronger signals trump weaker ones. In this way, emotional processes are critical for making good long-term decisions. People deprived of appropriate emotional signals—because of damage to the ventromedial prefrontal cortex or the insular cortices, for example—may fail to perceive potential adverse long-term consequences. Thus, we believe that too little emotion can undermine effective decision-making.

To test this neural theory of faulty decision-making, we have used an extensive battery of neuropsychological tasks. For example, the Iowa Gambling Task provides a close analogue to real-life decision-making by setting up situations with rewards, punishments, and unpredictability. The task taxes decision-making functions that are mediated by the ventromedial prefrontal cortex because it requires the participant to forgo immediate and alluring rewards in favor of rewards that provide greater long-term benefits. Using skin conductance—an index of physiological arousal collected via electrodes placed on the palms of the hands—we can measure a person’s emotional arousal during the task.

We have found that one-quarter to one-third of seemingly healthy older adults perform the task the way neurological patients with ventromedial prefrontal cortex injury do: Both exhibit a preference for choices that lead to high immediate reward but greater long-term punishment. We call this seemingly healthy subgroup the “impaired” decision-makers. In contrast, the larger subgroup of older adults selects choices that have low immediate reward but higher long-term reward. We call this group the “unimpaired” decision-makers. In other studies, we have found that impaired decision-makers have difficulty discriminating between advantageous and disadvantageous choices, also reminiscent of findings involving neurological patients with ventromedial prefrontal cortex or insular damage.

We gave impaired and unimpaired groups a consumer task in which participants read a booklet of advertisements like those they might find in a typical magazine. The booklet is a mixture of nondeceptive ads and ads that the Federal Trade Commission has deemed deceptive or misleading. We found that the impaired decision-makers showed poorer comprehension of deceptive ads—and were more likely to say that they would purchase the featured products—compared with unimpaired decision-makers. This study provides direct evidence that the subset of older adults with impaired decision-making abilities (as defined by the Iowa Gambling Task) is particularly vulnerable to fraudulent advertising.

**Pinpointing Specific Brain Regions**

To complement neuropsychological studies, scientists have used
neuroimaging to link certain behaviors to specific parts of the brain. Our team has used imaging to explore the inner workings of the brains of older impaired decision-makers. One technique, magnetic resonance imaging (MRI), enables us to examine the brain’s structure in high-resolution. Comparing the MRI results of 20 impaired older adults with those of 20 unimpaired older adults, we found that the impaired group displayed a comparative thinning of an area within the broader region of the ventromedial prefrontal cortex. This region is critical for complex, emotion-related decision-making. This finding is yet another clue about what has gone awry in the brains of elders who make poor decisions.

We recently began using positron emission tomography (PET) to examine the brain's metabolism and cell functioning. PET imaging entails use of a small amount of a radioactive tracer that attaches to glucose and records the brain's utilization of glucose for energy. The resulting picture of differing levels of regional glucose metabolism may indicate abnormal states in the body. (The use of PET has become widespread among doctors diagnosing several neurodegenerative diseases. This is a noteworthy advance because accurately recognizing and differentiating among various types of dementias is a considerable challenge.)

Our ongoing PET imaging study involves 48 older adults, 24 with impaired decision-making and 24 with unimpaired decision-making as measured by the Iowa Gambling Task. To date, our results link intriguingly to our overall framework for explaining why some older adults seem to have impaired decision-making abilities: Several areas of their brains have lower metabolism compared with the brains of older adults who are unimpaired. These brain regions, which include those that are critical for representing emotional states, belong to the brain circuitry involved in the somatic marker hypothesis.

Blue shading from positron emission tomography (PET) scans indicates brain regions in which glucose metabolism was lower on average in impaired elderly decision-makers than in those who were unimpaired. This may reveal an underlying abnormality in the impaired group. (Image courtesy of David Rudrauf, Ph.D., director, Brain Imaging Laboratory, University of Iowa)
Equally noteworthy, the impaired and unimpaired groups show no consistent metabolic differences in their temporal lobe structures, including medial temporal lobe sectors that are important for memory. These findings, which support our neuropsychological and MRI results, suggest that abnormalities in areas involved in emotions and complex decision-making—rather than areas involved in memory—make some older adults especially susceptible to fraud. To our surprise, the areas involved in working memory, such as the dorsolateral prefrontal cortex, did not appear to be active in the neural representation of decision-making among the older adults we studied. These findings are significant because they suggest that older adults who make poor decisions are not simply “demented,” but rather display relatively localized abnormalities in regions of the prefrontal cortex known previously to be important for judgment and making complex decisions.

Possible Interventions

What can we do to identify, protect and help an older adult who is vulnerable to faulty decision-making? In terms of identification, our research findings suggest that someone who is at risk may appear to be of sound mind and body, but family and friends should look for disturbing external signs. Such signs might include the receipt and accumulation of large amounts of mailers with disguised sales pitches, frequent phone and mail-order purchases, large bank withdrawals and dwindling savings. Some affected older adults and their families have set up safety mechanisms such as putting limits on bank withdrawals and personal checks.

Our findings may enhance community efforts to educate consumers and to protect people most at risk of becoming victims of fraud. For example, a public service campaign could show elderly people and their families how to identify predatory marketing practices, respond to potentially fraudulent sales approaches and seek professional help if they fall victim to fraud. Educating older adults also could help them focus on the longer-term consequences of their choices in an effort to decrease their susceptibility to fraud. Testimonials from victims, which can carry strong emotional content, may be particularly effective.

When we and other researchers have more closely identified the neural circuits involved in faulty decision-making, we can develop additional measures to help vulnerable older adults. For example, we might prescribe medications targeting impaired neural systems. Studies involving younger adults link impaired decision-making to abnormalities in
brain systems that transmit serotonin and dopamine, chemicals that cells use to communicate. Thus, drugs that target these neurotransmitters may be a potential intervention. Another treatment strategy might involve identifying genetic and environmental risk factors for impaired decision-making.

Unfortunately, we cannot always rely on the patient to report his own problems. People with frontal lobe dysfunction often suffer from impaired awareness and insight (anosognosia); they are unaware of both their own deficits and the ways in which their behavior affects other people. Neurological patients with impaired awareness may deny that they have anything wrong with them, even though their deficits are patently obvious to everyone around them. These patients are particularly liable to place themselves in harm’s way, and a significant number of older adults who have fallen victim to financial scams may have such impairment. This makes it more important—and difficult—to detect a person’s potential impairment and to design interventions and treatments.

Elderly people with decision-making impairment need more than support from family and friends. They need legal and societal protection from fraud and predatory marketing. We hope our neuroscientific data helps to inform public policy and legislation. As we confirm and extend our research, we anticipate it will prompt strong protections that substantially reduce the number of older adults who are victimized by marketing schemes. We may not be able to eradicate predatory practices completely, but our ongoing research will foster greater understanding of people’s potential vulnerabilities and arm us to combat fraud and its consequences.

References


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