

Exploring the principles of the influence of mental illness on decision-making

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Abstract. Much of the literature has focused on how emotions affect decision-making, but little has been written about the impact of specific mental illnesses on decision-making. However, this is a serious and relevant topic because people living with mental illness tend to make impulsive or bad choices because of their symptoms and mood. It is hoped that this literature will help people with mental illness or their families to have a better understanding of their behaviour and decisions. This paper attempts to answer the two questions. What cognitive and physiological factors influence the decision making of people with depression and how does depression influence people to make the decision to commit suicide. We used mainly a literature-based approach to our research and conclude that the areas of the brain affected by depression are strongly associated with decision-making and thus contribute to the tendency of depressed people to make poor decisions. For example, the areas of the brain affected by depression are strongly associated with decision-making and thus contribute to the tendency of depressed people to make bad decisions.

Keywords: Decision-making; depression; suicide.

1. Introduction

Use Like the use of mobile phones, dealing with uncertainty is an inevitable part of life. However, not everyone can make decisions with a clear head. As a result of severe psychological attacks, sufferers can lose some of their ability to think and judge, making them vulnerable to poor decisions.[1]According to the World Health Organisation, mental health is about thinking, learning, and understanding one's emotions and the reactions of others. Mental health is a state of balance that includes internal and external aspects. Physical, mental, social, cultural, spiritual, and other relevant factors create this balance. [2]This cognitive impairment can significantly impact an individual's ability to live, work, learn and adapt socially. People with a wide range of mental illnesses have impaired cognitive functioning. Patients with anxiety disorders and depression suffer from neurotransmitter abnormalities in the brain, which can lead to headaches, brain dysfunction, and a feeling of being unable to turn around or slow thinking.[3]

The patient may not be rational and objective enough to make decisions. This is not a good time to make big decisions. Severe cognitive impairment can lead to making poor choices with some adverse consequences. For example, not adhering to medication, having reviews, or participating in rehabilitation, even in severe cases, can lead to suicide.[1]

Current evidence on emotions and decision-making research at the neuronal level. One report suggests that prefrontal cortex involvement in anxiety in clinical anxiety, where the amygdala would have a crucial role in biasing attention, is a critical component of the brain system for cognitive influence. Also, the prefrontal cortex (PFC) appears to be involved in negatively interpreting anxiety disorders.[4]

Then again, the PET studies of Murphy et al. [5]and Drevets et al.[6] showed similar findings: the PFC, the entorhinal test striatum, the amygdala, and the dorsal midbrain thalamus have abnormal activity in individuals with unipolar depression or bipolar disorder. This underlines the importance of neuronal networks for mood .[7]

Many studies have looked at how emotions influence decision-making in everyday life but have neglected to examine the emotions of people with mental illness and how abnormalities in brain neurotransmitters affect their decision-making following certain mental illnesses.[1] More importantly, the existing research on this topic does not take into account other factors that influence the data, such as the characteristics of the person's demeanor, how the illness is treated[8], or the degree of mental illness[5]. At the same time, most studies have examined the impact of mental illness on decision-making with a limited number of individual decision models.

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This essay it is reviewing how decision-making is defined and then how depression, as well as anxiety disorders, are associated with decision-making. How emotions in mental illness affect decision-making and why bad decisions are made that lead to severe consequences is a topic worthy of further study. Therefore, it is relevant to summarise the existing essays and further investigate the relationship between the two to reduce the number of bad decisions paired with treatment or daily life for people with mental illness that can lead to severe consequences later on.

2. Selection criteria

This article defines the basis for decision-making:

In research from Schoemaker & Russo[9], decision-making is processed by which individuals, groups, or organisations make decisions about future behavior, depending on a range of purposes and available resources. The process often involves framing the problem, gathering intelligence, drawing conclusions, and learning from the experience. Decision-making is the complex process of translating choices into action based on indicators that represent the importance of those choices to the individual.[10]

Choose suicide: According to Oravecz & Moore[11], we can summarise that suicide should be categorized as suicidal ideation, a suicide plan, and a suicide attempt.

Furthermore, according to World Health Organization[2], mental health is the basis for well-being and efficient functioning. This essay's determination of mental illness is based on the research of mental illness according to the International Classification of Diseases (ICD-10/11) or the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM-IV or DSM-V); the manifestation of psychologically related conditions or external features (e.g., psychological distress, self-harm and suicide attempts, plans); mental health as defined by validated psychometric methods[12].

3. Defining decision making

3.1 Decision-making process

Herbert Simon decomposed the task of rational decision-making in three steps: (1) identification and delineation of all alternatives, (2) determination of the consequences of each alternative, and (3) a comparison of the accuracy and efficiency of each of these sets of consequences[1]. In the book by Schoenfeld[13], the decision-making process has six steps in the rational model: identifying the problem, generating alternatives, evaluating alternatives, choosing an alternative, implementing the decision, and evaluating decision effectiveness.

3.2 Somatic marker hypothesis

Somatic markers can help direct attention and thus away from the most unfavourable options, simplifying the decision-making process when cognitive processes are

overloaded, and people cannot provide an informed choice[14]. Somatic markers may occur in the ventromedial prefrontal cortex, associating the reinforced stimulus with the associated physiological emotion.[15] When making decisions in complex and uncertain situations, all somatic markers associated with the relevant stimuli are added to produce a net somatic state used to guide appropriate decision-making. [16]

The Iowa Gambling Task was developed to evaluate how well VMPFC patients make decisions in such challenging and ambiguous situations. To maximise their earnings, participants were instructed to select from four decks of playing cards regularly, each of which had an uncertain chance of winning or losing. The amygdala and prefrontal cortex were essential components of this hypothesized mechanism.[17] In the later modified version of the Gambling Task, Hinson[18], the gains and losses of the previous version are still probabilistic. However, the total returns have been less extreme, making it more challenging to spot attractive selections. A second alternative has been added that results in long-term gains rather than losses. It was concluded that working memory also affects somatic markers, as the increased working memory load generated by the secondary task resulted in poorer gambling performance. As a result, the compromised function of the working memory leads to ineffective development of somatic markers, which may lead to compromised decision-making.

3.3 Ventromedial prefrontal cortex and amygdala

Damasio[17] proposed in the somatic marker hypothesis that both the ventromedial prefrontal cortex and the amygdala are components of the nervous system required to implement favourable decision making.

This result has also been demonstrated over the last few decades. A large body of research in cognitive neuroscience has established the ventral medial prefrontal cortex as the central brain structure for value-based decision-making.[10] In the primate brain, 'vmPFC' commonly refers to the network of interconnections between the lower regions of the medial and lateral prefrontal cortex.[19] lesions in the vmPFC can lead to a variety of decreases in decision-making ability[20], including reinforcement learning,[17] risky gambling[21] or choosing between options with uncertain outcomes in the form of simultaneous risk and ambiguity,[22] in addition to a role for the VMF cortex in sorting out conflicting rewards and punishments.[23] Finally, People with damage to the lateral prefrontal cortex can still make morally correct choices under hypothetical circumstances, but they are severely impaired in making personal and social decisions. The inability to effectively integrate somatic state information elicited by the amygdala, the hypothalamus, and brainstem nuclei is associated with poor decision-making related to VMF damage.[23]

Amygdala lesions play a crucial role in human decision-making because they affect how the brain learns to react to complicated cognitive information.[23] Damage to the

human amygdala impairs autonomic control, resulting in decreased reactions to various stressful or emotionally charged stimuli.[24] As a result, after amygdala damage, losing money no longer triggers a desire for money, and winning or losing money does not trigger somatic feelings.[23] The amygdala is a component of the "impulse system" involved in decision-making, according to a new study by Bechara[25], published six years later. This is because the amygdala causes emotional reactions. Additionally, Trane & Hyman's[26] study demonstrated that people without an amygdala exhibited worse judgment and decision-making in actual social interactions.

3.4 Decision-making problems

In many cases, decision-making relies too heavily on the past, so on causes mental shortcuts. We may use heuristics as a shortcut when making judgments or decisions, which can lead to quick conclusions and decisions but can also lead to mistakes.[27]

When looking back, people may regret why they made those decisions in the first place, especially those decisions that led to bad outcomes after they made them.

According to Carmichael, [28]server bias contributes to incorrect choices. This essay only introduces part of them.

1. Anchoring-The judgment of something is arbitrarily biased by recent irrelevant information. [29]
2. Confirmation. - The tendency to seek out and pay attention to evidence that confirms one's beliefs.[30]
3. Overconfidence: When people believe too much in their abilities, the accuracy of decisions is less than people's belief in their knowledge.[31]

4. What cognitive and biological factors influence the decision-making about suicide for people with depression?

4.1 What is Depression and risk factors of it

Depression is a common mental disorder, with the World Health Organization projecting that globally, an estimated 3.8% of the population is affected, including 5.0% of adults and 5.7% of adults over 60, with approximately 280 million people suffering from depression. [32]What exactly is depression? What causes it? Moreover, what does it change about us? According to the National Library of Medicine, depression is a mental illness that can affect moods, such as causing chronic feelings of sadness, emptiness or hopelessness, and loss of interest in activities once enjoyed, as well as affecting behaviour and overall health. There are no single causes of depression, and from the 303 patients' perceptions, it can be divided into the following leading causes from environmental factors[33]:

1) Current life stressors

A total of 208 patients reported they think their current life is the cause of depression

The main categories are

- 1.1) Work situation 33.3% (101)
- 1.2) Family situation 24.1% (73)
- 1.3) Somatic illness 11.9% (36)

2) Past life events

The main categories are

- 2.1) Death of relative or friend 9.9% (30)
- 2.2) Broken relations 8.9% (27)
- 2.3) Childhood 6.6% (20)

3) Constitutional

The main categories are

- 3.1) Personality 31.4% (95)
- 3.2) Ambitious 17.8% (54)
- 3.3) Sensitive 5.3% (16)

Further, in Kong Lingyuan and Wu Yue's article, [34]it can be found that abnormalities in the physiological functions of the internal organs are physiologically responsible for people suffering from depression:

1. Abnormalities in the heart's function, which governs the blood vessels, and the deficiencies in the production of refined nutrients by the body. These abnormalities can lead to negative emotions such as sadness and worry interfering with the normal functioning of the body's physiology, resulting in a lack of interest in the things one usually enjoys.

2. Abnormalities in liver function can lead to difficulties in the standard transformation and metabolism of the body's emotions. As a result, the body is dominated by negative emotions such as sadness and grief for an extended period, which can lead to prolonged unhappiness, emotional instability, easy anger or frequent crying, and other depressive symptoms.

3. Prolonged spleen deficiency can cause people to be able to control their emotions and other vital activities.

4. Poor kidneys can lead to a decrease in the motivation of the body's activities, leading to a lack of interest in anything.

Abnormal lung function directly affects the human body's emotions, such as sadness, causing chest tightness, shortness of breath and depression, Abnormally lung function directly affects the human body's emotions, such as

sadness, causing chest tightness, shortness of breath, despondent and other depressive symptoms. Studies have shown that having parents and grandparents with depression doubles the risk of their offspring developing the same disorder, so a family history of depression may increase the risk of developing the disorder.[35]

4.2 How Depression Affects the Brain

No one knows what causes depression, but researchers have determined that brain chemistry plays a significant role.[35] According to research over the past 15 years, the insula, dorsal and medial prefrontal cortex, ventral anterior cingulate cortex, and orbital frontal cortex are all cortical brain regions associated with depression.[36] For example, the orbitofrontal cortex [37]and frontal lobe volume[38] may be associated with depression. Also, a decrease in medial prefrontal cortex volume may be present in depression.[39] The grey matter in the ventral anterior cingulate cortex (ACC), the dorsolateral and dorsomedial prefrontal cortex, the amygdala, and the parahippocampal grey matter are all significantly reduced in volume when people suffer from depression.[40] At the same time, the amygdala is associated with emotional responses. When cortisol is active throughout the day, it causes the amygdala to expand and become more active, exhausting the body and possibly affecting neurotransmitters in the brain, leading to mood swings, lack of appetite, and sleep disturbances, which can lead to depression.[41] In addition to this, patients experience daily cortisol dysfunction. It can increase inflammation due to stress and may even cause or exacerbate pain.[42] Chronic stress stimulates microglia activity, which increases the production of pro-inflammatory

cytokines in the brain. The regional specificity of microglia activation is thought to contribute to depression-related neural circuits. At the same time, fMRI studies have found that peripheral inflammatory markers are associated with neural circuits of emotion regulation, reward processing, and cognitive control in depressed patients. [43]

In addition, studies clearly show a 30% increase in inflammation in people who have suffered from depression for over ten years, suggesting that brain inflammation worsens depression. [44]According to a recent study [45] persons with depression have smaller brains in some areas. The hippocampus, thalamus, amygdala, and prefrontal cortex are among them.[46] The degree of regional shrinkage, which denotes that when a section of the brain shrinks, the capacity to govern associated processes is diminished, is correlated with the intensity and duration of depressive episodes.[46] Finally, according to a study by Gorwood, [47]practically all depressive individuals may experience deficiencies in pleasure, problems with interpreting emotions, and a lack of proper emotion regulation due to prefrontal cortical dysfunction in the amygdala.

4.3 Relationship between depression and decision-making

In Murphy et al.'s research, [5] manic and depressed patients who were medicated continued to have difficulties in this computerised decision-making task, such as slower deliberation times, failure to accumulate as many points as normal healthy controls, and sub-optimal betting strategies. Moreover, depressed patients tend to be risk averse, more sensitive to negative feedback stimuli such as punishment, and less responsive to positive feedback stimuli such as rewards.[48] In addition, although clinical data remain limited,

some researchers suggest that the activity of the amygdala in attending to, assessing, and anticipating negative stimuli may enhance cognitive and emotional responses to potential threats in patients with anxiety disorders[1]. Thus, everyday decisions made by people with anxiety disorders to avoid exaggerating perceived threats may impact the ability to function adaptively. [1]

According to Guo Zongjun[49], four brain regions, including the middle temporal gyrus, medial prefrontal, inferior temporal, and medial superior frontal gyri, were activated in depressed patients when making risky decisions. The control group activated the orbitofrontal, inferior occipital, parahippocampal, post-central gyrus, medial prefrontal, superior frontal, middle frontal gyrus, inferior frontal gyrus, inferior frontal gyrus triangle, middle temporal gyrus, inferior temporal gyrus, and anterior cingulate gyrus when making risky decisions. The brain areas with reduced activation for decision-making in depression contain reward-loss areas, so there is reduced responsiveness to rewards and losses when making decisions in depressed people.

In a study in which participants were asked to make and explain their decisions in a hypothetical situation in the form of free responses, the results showed that individuals with higher levels of depressive symptoms perceived fewer resources available to them and therefore used fewer adaptive strategies in making their decisions. It is possible that because of this, they may make less effective decisions and make decisions that are less likely to advance their interests. [50] This may be because people with depressive disorders have lower confidence in decision-making and feel more pressure to make decisions. This is why they are more likely to use maladaptive

responses and less likely to use maladaptive responses.

4.4 How does depression influence the decision-making on suicide?

More than 700,000 people commit suicide yearly, and many more attempt it. [51] Loss of the ability to work and learn and the inability to have positive and effective interpersonal interactions are examples of the mental health consequences of depression, as depression impairs this cognitive flexibility.[3] Depression alters patterns of thinking and feeling, preventing those affected from seeing a way out of their current state of mind and thinking about the possibility of feeling better in the future.[52] People with depression not only cling to the status quo but are trapped in all the frustrations they have experienced, all the losses and failures in their relationships, all the negative childhood experiences, and are further pulled down by all the negative emotions.[51] Furthermore, depression amplifies pain perception, so suicide may be the only way to escape pain and stress.[53] According to the US Department of Health and Human Services, approximately 2% of those who have ever been treated for depression in an outpatient setting will die by suicide. Of those who had been treated for depression in a hospital inpatient setting, approximately 4% would have committed suicide. Those who were hospitalised for treatment of depression as a result of a suicide attempt were approximately 6% more likely to die by suicide. In terms of annual suicides, it is estimated that about 60% of those who commit suicide have a mood disorder (e.g., major depressive disorder, bipolar disorder, depression). About 2 percent of those who have ever been treated for depression in the outpatient setting will die. Among those who had been treated for depression in an inpatient

hospital setting, about 4 percent would have committed suicide. Those who had been hospitalised for depression following a suicide attempt were about 6 percent more likely to die from suicide. It is estimated that of those who commit suicide every year, about 60% of those who do so suffer from mood disorders (for example. Main depressive disorder, bipolar disorder, depression). According to Kielholz[54], the article describes these risk factors, focusing particularly on those that may require special consideration.

1. Chemical substance change

In Desmyter et al.[55] research, inadequate prefrontal perfusion can lead to a reduced ability to solve problems and act on negative emotions, leading to suicidal behaviour.

2. Severe somatic symptoms lead to depression

Depression is not only a mental illness but can also cause physical symptomology. Some of the effects depression may have on the body are pain, stomach Depression can cause dull pain that can affect the joints, limbs[56], or back.[57] Some patients may commit suicide because they cannot tolerate insomnia. [58] This somatic symptom can lead to great suffering, and patients live with this pain every day, making them feel that there is no hope for their days; day after day, their patience and expectations are wearing away a little, and finally, they understand the disease and that the only way to be relieved and less miserable is to end their lives.

3. Calm period of decision making

The probability of suicide in depressed patients may suddenly increase after the onset of the illness, during the recovery period, and after discharge, possibly during a period of calm, which is often a turning point in the decision-making phase of depressed patients.[58]

4. Severe self-guilt feelings

Findings suggest that generalised guilt, contextuality, and generalised shame mediate the relationship between emotional empathy and depressive symptoms. [59]Once a person suffers from depression, they deny themselves completely and feel they cannot do anything. They even begin to feel guilty, that they are a drag on their family and that living in this world is a sin, so they begin to feel that there is no point in living.

5. Severe anxiety/irritability

Many people with depression are pessimists,[56] like having a high-powered magnifying glass in their heads. For example, failing this foreign language exam is due to a lack of language talent rather than a lack of effort to revise. So if life goes smoothly, it is fine, but if one is faced with a family accident, unemployment or illness, it may immediately overwhelm the depressed person.

6. Substance use and impulsivity

Drugs and alcohol can also affect suicidal people, making them more impulsive and more likely to act on their impulses than when sober. Drug and alcohol use can lead people to commit suicide for other reasons, such as loss of jobs and relationships.[60] Rates of substance use and alcohol use are also higher among people with depression and other mental illnesses.[58] Put these together, and the risk increases.

5. Conclusion

There are many causes of suicide in people with depression, but not a single one and no scholars have yet been able to give a complete account of all the causes. However, there is no doubt that people with mental disorders are much more

likely to commit suicide than those without mental capacity, and of those with mental disorders, 60-70% have depression. [58]Some people with depression do not always show all outward symptoms.[56] However, the earlier depression is diagnosed, the earlier appropriate treatment can go a long way toward preventing suicide. [58] Everyone only has one life to live and cannot afford to do it all over again, and everyone must take seriously the suicidal thoughts or behaviours of those around them who are depressed.

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