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Physiological Changes Observed During the Lying Process

Guzal Toshmatova Adilkhodjaevna
Department of Environmental Hygiene , Tashkent Medical Academy , Tashkent , Uzbekistan.
E-mail: madinashatursunova21@gmail.com

Erkinov Isl o m Arslonovich
Tashkent Medical Academy, Faculty of Medicine No. 1, student of group 215, E-mail: islomerkinov45@gmail.com

Islamboev Nodirbek Dilshodovich
Tashkent Medical Academy, Faculty of Medicine No. 1, student of group 215.
E-mail: nodirbekislomboyev1@gmail.com

Abstract: Lying has a significant impact on a person's physiological state. Research shows that during deception, there is an increase in heart rate, a change in breathing rhythm, activation of sweat glands, and an increase in blood pressure. This article analyzes the main physiological changes that occur during lying and their neurobiological basis. It also discusses the effectiveness of using polygraphic methods and modern neurophysiological approaches to detecting lies. The results of the study contribute to a deeper understanding of human physiology and expand the possibilities of practical application in the field of law enforcement and psychology.

Key words: lying, physiological reactions, heart rate, breathing rhythm, sweating, blood pressure, polygraphy, neurophysiology, stress physiology.

Lying has a long history in human society, influencing a wide range of areas, from interpersonal relationships to social and political processes. Modern research focuses not only on the moral and social consequences of lying, but also on its physiological impact on the human body. In our time, problems such as stress, insomnia, cardiovascular disease, and weakened immune systems are becoming increasingly common, and the process of lying is considered one of the possible causes of these conditions.

Scientific research shows that lying causes stress in a person and provokes various physiological changes. In particular, the nervous system is significantly activated in this process: the brain spends additional energy trying to reconcile the lie with the truth. An increase in the level of stress hormones leads to increased heart rate, increased blood pressure and tension in the cardiovascular system. In addition, chronic lying can cause insomnia and a constant feeling of fatigue, which, in turn, negatively affects the recovery processes in the brain and body [3].

The negative impact of lying is not limited to the cardiovascular and nervous systems — the immune system suffers as well. If the level of the stress hormone cortisol remains high for a long time, the body becomes more vulnerable to viruses and bacteria. Research shows [1] that people who are prone to chronic lying are more likely to suffer from colds and infectious diseases. The digestive system also suffers: cortisol [2] promotes excessive production of gastric juice, which can lead to increased acidity, abdominal pain, diarrhea, and nausea.

The psychological and social consequences of lying are also not ignored. Research conducted at the University of Notre Dame [5] showed that people who try to avoid lying feel happier, their emotional state improves, and their relationships with loved ones become stronger. On the contrary, people who are prone to lying are more likely to suffer from depression, anxiety, and dissatisfaction with life.

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This article analyzes in detail the impact of lying on the nervous, cardiovascular, immune systems, as well as sleep and digestion. Research results [7] show that lying is not only a moral problem, but also a serious threat to human health. Telling the truth means having a beneficial effect on the body, improving the overall physical and psycho-emotional state of a person.

Purpose of the study: The purpose of this study is to scientifically analyze the physiological impact of lying on the human body, including the nervous, cardiovascular, and immune systems, as well as sleep and digestion.

Research form: This study is based on experimental, analytical and questionnaire methods. The work analyzes the results of previous scientific studies and data obtained by measuring physiological changes. Also, by means of anonymous questionnaires, the physiological and psychological states of students when telling lies are studied. The obtained data are subject to statistical analysis, compared with scientific literature and conclusions are made.

Results and discussion: The survey involved 159 students from the faculties of general medicine, medical prevention and public health, dentistry, nursing, pediatrics, environmental protection and human health of the Tashkent Medical Academy. Among the participants, 64.8% were students aged 17 to 20, 20.1% were aged 21 to 23, and the rest were over 24 years old. Of these, 62.9% were girls and 37.1% were boys.

How often do you lie?	Percent (%)
Never	1.3
Very rarely (1-2 times a month)	46.5
Sometimes (several times a week)	41.5
Often (almost every day)	10.7

When asked, “What do you feel after you lied?” 24.5% of respondents said they felt anxious and stressed, 35.8% said they felt remorse, 37.1% said they sometimes felt discomfort and sometimes they didn’t, and only 2.5% said they didn’t feel any discomfort at all after lying.

In what situations are you forced to lie?	Percent (%)
To protect yourself or others	22.6
To avoid hurting other people's feelings	44.7
To get out of an awkward situation	31.4
I never lie	1.3

Analysis: These results show that most people (almost 60%) experience discomfort after lying. Anxiety and remorse directly affect a person's psychological state, which can lead to an increase in the level of stress hormones - cortisol and adrenaline. Some respondents (37.1%) could adapt to such situations or experience different emotions depending on the circumstances.

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Physical changes observed during lying

Physical change	Number of responses	Percent (%)
The heartbeat quickens	101	63.5%
Breathing changes	75	47.2%
Sweaty hands or body	51	32.1%
Voice trembles or changes	53	33.3%
The pupils dilate	21	13.2%
I don't feel any changes	32	20.1%

Analysis: Most students report changes such as increased heart rate (63.5%) and changes in breathing (47.2%) when lying. This indicates that the body's "fight or flight" response is activated. When stressed, the body's cortisol and adrenaline levels increase, which activates the cardiovascular and respiratory systems.

Sweating (32.1%) and voice changes (33.3%) are reactions of the autonomic nervous system, since when lying, a person experiences greater psychological and physical stress than in a normal conversation. Dilation of the pupils (13.2%) is an individual reaction to stress that does not occur in everyone. Those who do not feel any changes (20.1%) may have already gotten used to lying or experience less stress when doing so.

What psychological changes do you experience after lying?

- 55.3% – “I feel guilty”
- 18.9% – “I feel stressed and nervous”
- 18.9% – “I don’t feel any changes”
- About 7% – “Insomnia or anxiety”

Analysis:

The responses show that lying has a significant impact on a person’s psyche. The most common response was guilt, which indicates an internal struggle related to moral and ethical principles. More than 40% of respondents also indicated stress, irritability, and sleep problems after lying.

However, 18.9% of participants said they did not experience any psychological changes, which indicates that different people have different sensitivity to lying.

Do you experience headaches or signs of stress when you lie?	Percent (%)
Yes, always.	13.8%
Sometimes	55.3%
No, no changes.	30.8%

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Most students (54.7%) assume that lying can be harmful, but believe that scientific evidence is insufficient. However, 37.1% are convinced that lying harms the body in the long term. This suggests that many base their opinion on personal experience or a general idea about the harm of lying. At the same time, 8.2% believe that lying does not affect the body in any way, which confirms the existence of different views among people.

The results showed that the majority of students (65%) noted a physiological reaction of the body when lying, in particular, rapid breathing. This is probably due to stress or adrenaline release.

What physical reactions are observed after lying?	Percent (%)
Muscle tension	9.4%
Feeling of heat in the hands or face	26.4%
Pain/discomfort in the abdominal area	10.7%
I don't feel any changes	53.5%

About 35% did not feel any changes, which may be due to individual psychological characteristics, experience or lower emotional sensitivity to lies.

63% of students reported that the timbre or speed of speech changes when lying. This may be due to psychological stress, anxiety or uncertainty. A change in intonation is especially important - a lowering or raising of the voice can serve as one of the signs of a lie.

18.9% did not notice any changes, which again indicates individual differences and different reactions to lies.

Analysis: 53.5% of students do not feel physical reactions when lying, but 55.3% note that they sometimes experience signs of stress. This indicates that lying most often manifests itself as psychological stress.

Do you experience headaches or signs of stress when you lie?

The least common reactions were muscle tension (9.4%) and persistent headache (13.8%).

Lies and somatic reactions. The survey results showed that 35.8% of students experience insomnia when lying. This may be due to a disruption in the activity of the parasympathetic nervous system and an increase in cortisol levels [Snyder et al., 2021]. 30.2% of respondents reported a headache, which may indicate the development of stress-induced tension headache (TTH) [ICHD-3, 2018]. 8.8% experience increased heart rate (tachycardia), which indicates activation of the sympathetic nervous system [McCraty, 2015]. 20.1% do not feel any reactions, which may be associated with psychopathological characteristics or alexithymia - the inability to recognize and express emotions [Taylor & Bagby, 2013].

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Strategies for Avoiding Lying. 47.8% of students strive to always tell the truth, which may be associated with moral conservatism or the desire to be socially approved [Gino et al., 2016]. 48.4% periodically resort to lying, which corresponds to the concept of moral flexibility [Bazerman & Tenbrunsel, 2011]. For 3.8%, lying is "part of life," which may indicate sociopathic tendencies or signs of antisocial personality disorder (ASPD) [Hare, 1999].

Evidence-Based Recommendations to Reduce Liar Tendency

1. Stress management (physiological approach): Lying activates the stress response: your heart rate increases, your blood pressure rises, and your cortisol levels rise [McCraty, 2015]. To reduce this:

- Increase parasympathetic tone: Practice deep breathing daily using the 4-7-8 method (inhale for 4 seconds, hold for 7 seconds, exhale for 8 seconds).
- Biofeedback training: heart rate monitoring and stress management in real time (using the HeartMath method).

2. Increased activity of the prefrontal cortex (neuropsychology): Lying is often associated with impulsivity and decreased prefrontal cortex (PFC) activity [Abe et al., 2007]. To strengthen it:

- Practice mindfulness meditation: 10 minutes a day increases PFC density [Lazar et al., 2005].
- Do cognitive exercises, such as playing chess or solving logic problems.

3. Emotional development and honesty: Lying is often used to reduce feelings of guilt. Instead:

- Develop emotional intelligence (EQ): learn to understand the feelings of others [Goleman, 1995].
- Practice the habit of telling the truth about everyday little things (like the weather).

4. Normalize your sleep:

A survey showed that 35.8% of people who lie suffer from insomnia. Lack of sleep reduces PFC activity [Walker, 2017].

Recommendation: go to bed and wake up at the same time, avoid blue light in the evening (limit the use of gadgets before bed).

Brief scientific conclusion: To reduce the tendency to lie, it is necessary to use physiological methods (stress management), neurological approaches (strengthening the PFC) and psychological practices (development of EQ). If lying has become a habit, this may indicate an internal conflict or a psychological compensation mechanism.

General conclusion

The survey results showed that lying causes various psychological and physiological changes in a person. Most participants reported increased heart rate, changes in breathing, sweating, trembling voice, and stress. These reactions confirm that lying is a stress factor and has a negative impact on both the body and the psyche. In the long term, it can harm health. Thus, lying should be considered not only a social but also a psychophysiological problem that requires study.

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