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# The Complex Relationship Between Body Mass Index and Suicide Risk: From Epidemiology to Biological Mechanisms – A Review

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**ABSTRACT**

**Introduction.** Suicide is one of the most serious public health problems worldwide. In the context of risk marker searches, researchers are paying particular attention to Body Mass Index (BMI). Scientific studies to date in this area are still unclear, indicating both a potential protective effect of obesity and an increased risk of suicidal behaviors in extreme weight categories.

**Purpose of the work.** This study constitutes a review of current literature regarding the correlation between BMI values and the risk of suicidal ideation and behaviors, considering the potential mechanisms underlying this relationship.

**Materials and methods.** An extensive literature search was conducted using the PubMed database. An analysis and synthesis of available epidemiological (cross-sectional and cohort) and clinical studies were conducted, covering diverse adult and adolescent populations from Europe, North America, and Asia. The review included works concerning completed suicides, suicide attempts, and suicidal ideation, as well as studies on biomarkers (serotonin, leptin, pro-inflammatory cytokines) and psychosocial factors.

**Summary.** The literature review indicates a complex pattern of the relationship between Body Mass Index (BMI) and suicide risk, most often assuming a "U" or "J" shape. Some studies have found that overweight and obese people have lower suicide mortality rates. However, more recent research shows that people with extreme obesity or who are underweight face a much

higher risk of suicidal behavior. Insulin resistance might lower impulsivity, but chronic inflammation and leptin resistance could make people more vulnerable to suicidal actions. For adolescents, the subjective perception of weight is a key risk factor. In adults, obesity can affect the selection of less lethal suicide methods.

**Conclusions**. Body Mass Index (BMI) is an important but sometimes unclear marker of suicide risk. The "obesity paradox", related to its possible protective effect on suicide risk, may result from physical barriers hindering the completion of suicide. Clinical assessment of the patient should include not only actual body weight and its dynamic changes, but also subjective body image and metabolic profile.

**Keywords**: BMI, obesity, underweight, suicide attempts, biological mechanisms, obesity paradox

## Introduction

Body Mass Index (BMI) is a widely recognized indicator of nutritional status. BMI is calculated by dividing a person's weight in kilograms by the square of their height in meters. The World Health Organization (WHO) classifies BMI values below 18.5 kg/m² as underweight, 18.5 to 24.9 kg/m² as normal weight, 25.0 to 29.9 kg/m² as overweight, and 30.0 kg/m² or higher as obese. Obesity is further categorized into three Classes: Class I (30.0–34.9 kg/m²), Class II (35.0–39.9 kg/m²), and Class III (40.0 kg/m² or higher) (WHO, 2000). For individuals aged 5 to 19 years, assessment standards are based on growth charts and standard deviations (Global Nutrition Report, 2020).

Suicide remains one of the most complicated issues for global public health. Every year, more than 720,000 people die by suicide, making it the third most common cause of death in the 15-29 age group, and the etiology of suicidal behaviors is complex (WHO, 2025).

Suicidal ideation includes thoughts, considerations, and plans regarding self-harm or committing suicide. They are significant predictors of suicide attempts and deaths (Han et al., 2016; Harmer et al., 2024). As research aimed at discovering possible correlates advances, the role of BMI is attracting increasing attention. This study strives to evaluate the mutual relationships between BMI values and the risk of the emergence of suicidal ideation and behaviors, considering potential mediating mechanisms and differences in study results.

**Low BMI as a Risk Factor**

Underweight is a problem that mainly impacts the poorest countries (Global Nutrition Report, 2020). Evidence for an inverse correlation between BMI and the risk of suicidal behaviors is provided by a cohort study conducted on a group of 1,133,019 Swedish men. It demonstrated a linear decrease in the risk of hospitalization due to suicide attempts with increasing BMI. Underweight men had a 12% higher risk of attempting suicide compared to those with normal body weight (HR=1.12). In contrast, being overweight or obese was linked to a 12% lower risk (HR=0.88). These results stayed the same even when patients with depression were excluded, which suggests that low BMI could be an independent risk factor (Batty et al., 2010).

Similar conclusions are drawn from a study based on the Korean National Health Insurance Service database. Using BMI criteria for the Asia-Pacific region, it was shown that the underweight group had a 44% higher risk of suicide death compared to the control group with normal body weight. Conversely, in the groups with overweight and Class I and II obesity, a statistically significant reduction in risk was noted by 21%, 24%, and 29%, respectively (Lee et al., 2025).

A British study involving 849,434 adults demonstrated that among men, the incidence rate of suicide attempts decreased linearly with increasing BMI, whereas women exhibited an „L-shaped" association. Particularly in women with depression, the risk was significantly elevated in the underweight group and declined at higher BMI levels (Gao et al., 2013).

A clinical analysis involving 1,429 suicide victims in Toronto revealed a specific health profile of underweight individuals. They more frequently suffered from serious somatic diseases (including cancer) – 12.2% compared to 4.4% in the normal weight group. This suggests that their suicidal motivation may be rooted in chronic pain and illness. This group was the only one characterized by a predominance of women (54.9%) (Hawkins et al., 2019).

**The Role of Weight Perception and Body Image**

In the assessment of suicide risk, alongside actual body weight, the individual's subjective viewpoint also has an important role. A study among Korean adolescents showed that compared to individuals with normal body weight, underweight individuals (BMI <5th percentile) were more exposed to suicide attempts. The largest, nearly 6-fold increase in risk (OR=5.95) was observed among individuals who erroneously perceived themselves as obese (Kim et al., 2023).

The dominance of subjective body image over objective BMI was also confirmed in a study that included a representative sample of 13,601 American high school students. Although BMI initially showed a link to suicide risk, it disappeared after accounting for self-perception of

weight. The analysis showed that students with extreme perceptions of their own weight, both "very obese" (OR=2.50) and "very underweight" (OR=2.29), had a more than two-fold higher risk of suicidal ideation. Significant ethnic differences were also noted: in white youth, the increase in suicide attempt risk occurred at both extremes, whereas in Black people, only perceiving one's body as "very skinny" increased this risk - this difference may result from cultural differences in the acceptance of higher body mass (Eaton et al., 2005).

Furthermore, gender plays an important role in how one perceives one's own body weight. A Korean cross-sectional study involving 5,683 adolescents aged 12–18 demonstrated that boys who perceived themselves as “thin” or “very thin” faced a nearly two-fold higher risk of suicidal ideation (OR=1.995). This may suggest the consequences of social pressure to conform to the muscular ideal of masculinity (Choi & Hong, 2023).

Jeong et al. (2025) conducted a longitudinal study involving 1,156,728 adolescents in South Korea. The results indicate that weight misperception increases the risk of suicidal behaviors. Adolescents with distorted body image are more likely to attempt suicide than those with accurate self-perception. This association is particularly strong in females, who are more than twice as likely to attempt suicide (OR=2.12). This evidence indicates that weight perception is an important clinical indicator of suicide risk among adolescents.

**High BMI as a Risk Factor**

A Mexican study of 42,269 adults found strong evidence that excess body weight can have a negative effect on suicidal behaviors. The researchers wanted to find out which factors might influence suicide attempts. It was demonstrated that the risk of a suicide attempt was 40% higher in obese individuals (OR=1.4) (Davila-Cervantes and Luna-Contreras, 2024).

A German population-based study conducted on 2,436 individuals showed a strong, positive relationship between obesity and the risk of attempting suicide. The most concerning results were found in people with extreme obesity (BMI ≥40). Their likelihood of attempting suicide was more than 12 times higher (OR=12.43), and their risk of suicidal behaviors was over 21 times higher (OR=21.22) than in people with normal body weight. Furthermore, in the group with Class I obesity, a 3-fold increase (OR=3.02) in suicidal behaviors and suicide attempts (OR=3.49) was observed (Wagner et al., 2013).

American studies support this finding, using two separate group analyses: one with 2,547 people from families and another with a representative sample of 41,589 people. Both groups showed that extreme obesity is a serious risk factor. In the general population, individuals with BMI ≥ 50 had a more than two-fold increase in the risk of a suicide attempt (OR=2.56), and in

the family group, nearly four-fold (OR=3.85). Moreover, the study revealed a "U"-shaped relationship: the highest values of suicide attempt indicators were visible in the groups of extreme obesity and underweight (Dong et al., 2006).

In a cohort study from Taiwan involving 542,088 participants, the relationship between BMI and suicide risk assumed a "J" shape - increased risk of suicide death was demonstrated in underweight as well as Class II and III obesity. In extremely obese individuals, this risk was over 3.5 times higher (HR=3.62) (Chang et al., 2012).

**Unhealthy Weight Control Strategies**

A five-year observation of a group of 2,516 adolescents and young adults did not show a significant relationship between BMI and body dissatisfaction and the subsequent occurrence of suicidal thoughts or attempts. This study suggests that it is not BMI itself, but unhealthy weight control strategies in the form of laxatives or inducing vomiting, that are stronger predictors of suicidal behaviors - women using the above methods had a 2.5 times higher risk (Crow et al., 2008).

These results match research on 109,023 American high school students. Unhealthy ways of tracking weight show a U-shaped link with health outcomes (Zhao et al., 2024).

The Whitehall study found that rapid weight loss raises the risk of suicidal thoughts or actions fivefold. Relying only on body mass index (BMI) may not accurately reflect real risk (Elovainio et al., 2009).

This is further supported by findings from a large-scale study on 69,585 Korean adolescents, which revealed that the combination of being underweight and engaging in inappropriate weight control behaviors (such as fasting or vomiting) carries the highest risk. Specifically, underweight girls employing these strategies were over 4.5 times more likely to attempt suicide (OR = 4.53) compared to those not using such methods (Lee et al., 2016).

In the context of food intake restriction and low BMI, a new and clinically significant term is RISH (Restricted Intake Self-Harm), which refers to restricting intake as a form of self-harm. Ellison and Philpot (2024) indicate that some patients who drastically restrict eating are not driven by a distorted body image (as in anorexia nervosa) but treat starvation as a method of indirect self-harm. This distinction is critical, as misclassifying these behaviors as classic anorexia may result in treatment approaches that fail to address their intentional and self-destructive characteristics.

**Does Obesity Protect? The Paradox in Light of Biological Mechanisms**

Contrary to the hypothesis concerning the possible protective effect of obesity on the risk of suicide death, results of the German 12-year cohort study MONICA/KORA Augsburg conducted on 12,888 individuals showed that obesity was associated with a significant and independent increase in the risk of suicide mortality. Obese individuals had a nearly 3-fold increase in the risk of death by suicide (HR=2.73) compared to individuals with normal BMI. The risk associated with obesity exceeded that associated with smoking (HR=2.23), living alone (HR=2.19), or depressed mood (HR=2.01) (Schneider et al., 2014).

A study of 499,441 American adults analyzed the relationship between body weight and suicide risk. Researchers investigated whether lower suicide mortality among obese individuals results from a reduced prevalence of established risk factors, including depression, social isolation, or access to pharmaceuticals. It was found that obese individuals (especially women) reported poorer mental health compared to individuals of normal weight. Moreover, obese men more frequently possessed firearms, which theoretically could increase the risk of completing a successful suicidal act. The fact that suicide deaths occur less frequently in obese individuals despite a higher burden of risk elements implies that the defensive mechanism results from the existence of strong biological or physical determinants that influence the phase of executing the intent, reducing the effectiveness of the suicide attempt (Mukamal & Miller, 2009).

**Biological Underpinnings: Serotonin, Insulin, and Inflammation**

The role of the serotonergic system in predispositions to suicide was proven in a study by Stanley et al. (2000). In patients who had never attempted suicide yet showed aggressive behaviors, lower concentrations of 5-HIAA (5-hydroxyindoleacetic acid), the main metabolite of serotonin, were found in the cerebrospinal fluid compared to non-aggressive individuals. Furthermore, individuals with reduced 5-HIAA levels had a significantly higher degree of impulsivity. These results show that serotonin deficit is a biomarker for traits increasing the risk of suicidal behaviors - impulsivity and aggression (Stanley et al., 2000).

According to Lee et al. (2025), the reduced suicide risk observed in individuals with obesity may be attributed to insulin resistance, a condition frequently present in this population and commonly associated with leptin resistance. Insulin resistance increases the concentration of free fatty acids in the bloodstream. These fatty acids compete with tryptophan for albumin binding, thereby increasing free tryptophan levels in the bloodstream. As tryptophan is a direct precursor to serotonin and readily crosses the blood-brain barrier, this mechanism could increase serotonin synthesis in the brain. Consequently, increased serotonin production in

individuals with obesity is believed to function as a biological protective factor that lowers the risk of suicidal behavior.

Adipose tissue hormones, such as leptin, are implicated in the regulation of suicidal behaviors. Kelesidis et al. (2010) report that leptin functions as a satiety hormone, with circulating levels reflecting total body fat stores. Leptin communicates satiety signals to the brain and suppresses appetite. In individuals with obesity, leptin resistance reduces the brain's responsiveness to leptin, causing a rise in food intake and further weight gain. Additionally, leptin resistance may impair metabolic regulation and alter brain circuits linked with impulsivity and mood, thereby contributing to suicidal behaviors. In a clinical study conducted on a group of patients after a suicide attempt, it was found that women diagnosed with major depressive disorder showed lower leptin concentrations in the cerebrospinal fluid (CSF) compared to women with other diagnoses, despite similar BMI values. Additionally, a negative correlation was demonstrated between leptin levels in the CSF and the severity of depressive symptoms - a more severe course was associated with a lower concentration of the hormone. These results support the hypothesis that leptin may constitute an "endogenous antidepressant," and its deficiency or lowered sensitivity to its action in the CNS may predispose to the development of intensified mood disorders and self-destructive behaviors (Westling et al., 2004). Given that suicide risk is closely linked to impulsive conduct (Stanley et al., 2000), leptin resistance may explain the lower suicide risk in obese individuals, as it may reduce impulsivity (Lee et al., 2025).

Research on the role of chronic inflammation sheds new light on the biological relationship between body weight and suicidal behaviors. In a study conducted on a group of adolescents with Major Depressive Disorder (MDD), the authors demonstrated that the co-occurrence of obesity and depression promotes mechanisms responsible for the amplification of the body's inflammatory response. Compared to patients with normal body weight, individuals with overweight and obesity showed higher concentrations of pro-inflammatory cytokines, such as IL-1β and IL-6. The observed state translated into clinical consequences: overweight individuals were more than three times more likely to be classified into the high suicide risk group with intensified depressive symptoms. The authors conclude that adipose tissue, as an active endocrine organ, promotes the development of neuroinflammation by releasing cytokines. This consequently worsens the prognosis and increases susceptibility to self-destructive behaviors, particularly among young adults (Ninla-aesong et al., 2023).

**Behavioral Factors: Influence on Selection of Suicide Method**

Obesity may limit the choice of suicide methods, which may play a role in a lower mortality rate in this group. A study conducted in Sweden based on autopsy data (N=39,368) confirmed that obesity is positively correlated with the choice of poisoning as a suicide method, and negatively with all other methods, with a drastic decrease in the risk of choosing hanging by as much as 67%. The study authors link this pattern directly to physical factors. They suggest that limited mobility in obese individuals is a mechanical barrier to methods that require agility, such as hanging or jumping from a height. Furthermore, somatic diseases co-occur more frequently in this group, which in turn facilitates access to prescription medications and consequently potentially increases the risk of utilizing them for self-destructive purposes (Wingren & Ottosson, 2016).

These observations were confirmed in a Canadian study, where obese individuals significantly more frequently used non-violent methods (Hawkins et al., 2019). A large American study of 4,005,640 war veterans found that body weight affects the choice of suicide method. Even though firearms were widely available, the study showed clear differences in the lethality of methods used based on BMI. People with obesity chose high-lethality methods, such as firearms or hanging, much less often than those who were underweight. Conversely, a nearly two-fold higher percentage of suicide by poisoning (16.8%) was noted among them compared to the underweight group (9.4%). Interestingly, the overall risk of death by suicide was 37% lower in obese individuals than in persons with normal body weight. This suggests that even with easy access to highly lethal methods, factors accompanying obesity may incline towards choosing methods of lower efficacy, and consequently, lower mortality (McCarthy et al., 2014).

**Discussion**

Current literature shows a complex relationship between BMI and suicide risk, often following a 'U' or 'J' pattern, with increased risk at both low and high BMI levels.

The mechanisms underlying suicide risk vary by weight category. In underweight individuals, risk is linked to frailty and chronic illness. For those with obesity, chronic inflammation and social stigma contribute to risk, though mortality rates are paradoxically lower, likely due to physical barriers that limit access to more lethal methods. Cultural context is also important. For instance, the lack of correlation in the United Arab Emirates suggests that religious and family support may reduce weight-related distress (Ibrahim & Mahfoud, 2021). Future research should focus on metabolic health indicators, such as insulin resistance and inflammatory markers, as these may provide more accurate risk assessments than BMI alone.

## Conclusions

Based on the literature analysis, it can be concluded that the BMI index is a significant, albeit ambiguous, risk marker. This correlation is not linear but often assumes a "U" or "J" shape -the highest risk of suicide attempts is observed in extreme groups, such as underweight and Class III obesity. Due to social marginalization and inflammation, obesity may increase the risk of suicide attempts, while simultaneously and paradoxically decreasing the chance of death resulting from taking one's own life due to the choice of less lethal methods and lower impulsivity. Modifying factors in the adolescent population are of key importance - often in youth, subjective perception of weight is more important than actual BMI, whereas in adults, the metabolic profile and comorbidities are of key importance. In clinical practice, the assessment of risk for suicidal ideation and behaviors should consider not only current BMI but also sudden changes in body weight, which are a strong predictor, as well as specific threats occurring in particular groups, such as body perception in adolescents and specific “red flag” behaviors like RISH.

## Disclosure

### Authors’ Contributions

Conceptualization was done by Martyna Świątecka; methodology by Martyna Świątecka and Jakub Kaźmierczyk; software by Aleksandra Marciszewska, checking by Ewa Buczkowska; formal analysis by Jakub Jopek; investigation by Sylwia Bryksy; resources by Natalia Popczyk; data curation by Hanna Tymchenko; writing-rough preparation by Agnieszka Przybyłowska; writing-review and editing by Ewa Buczkowska; visualization by Martyna Świątecka and Jakub Jopek; supervision by Agnieszka Piechowicz; project administration by Agnieszka Przybyłowska.

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**References**


1. World Health Organization. *Obesity: Preventing and Managing the Global Epidemic*. Geneva: World Health Organization; 2000. WHO Technical Report Series, No. 894.
2. Global Nutrition Report 2020: Action on Equity to End Malnutrition. Bristol, UK; 2020. Available from: https://globalnutritionreport.org/reports/2020-global-nutrition-report/ (accessed November 05, 2025).
3. World Health Organization. Suicide: Key Facts and Overview. March 25, 2025. Available from: https://www.who.int/news-room/fact-sheets/detail/suicide (accessed November 06, 2025).
4. Han B, Crosby AE, Ortega LA, Parks SE, Compton WM, Gfroerer J. Suicidal ideation, suicide attempt, and occupations among employed adults aged 18-64 years in the United States. *Compr Psychiatry.* 2016;66:176-186. https://doi.org/10.1016/j.comppsych.2016.02.001
5. Harmer B, Lee S, Rizvi A, Saadabadi A. Suicidal Ideation. In: *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK565877/ (accessed November 10, 2025).
6. Batty GD, Whitley E, Kivimäki M, Tynelius P, Rasmussen F. Body mass index and attempted suicide: cohort study of 1,133,019 Swedish men. *Am J Epidemiol.* 2010;172(8):890-899. https://doi.org/10.1093/aje/kwq274
7. Lee J, Lee SH, Kim MK, et al. Inverse association between obesity and suicidal death risk. *BMC Psychiatry.* 2025;25(1):27. https://doi.org/10.1186/s12888-024-06381-z
8. Gao S, Juhaeri J, Reshef S, Dai WS. Association between body mass index and suicide, and suicide attempt among British adults: the health improvement network database. *Obesity (Silver Spring).* 2013 Mar;21(3):E334-42. https://doi.org/10.1002/oby.20143
9. Hawkins M, Williams M, Schaffer A, et al. Body mass index weight categories in adults who died by suicide: an observational study. *J Affect Disord.* 2019;257:454-460. https://doi.org/10.1016/j.jad.2019.06.061
10. Kim B, Kim HS, Park S, Kwon JA. BMI and perceived weight on suicide attempts in Korean adolescents: findings from the Korea Youth Risk Behavior Survey (KYRBS)

2020 to 2021. *BMC Public Health.* 2023;23(1):1107. https://doi.org/10.1186/s12889-023-16058-z

11. Eaton DK, Lowry R, Brener ND, Galuska DA, Crosby AE. Associations of body mass index and perceived weight with suicide ideation and suicide attempts among US high school students. *Arch Pediatr Adolesc Med.* 2005;159(6):513-519. https://doi.org/10.1001/archpedi.159.6.513
12. Choi Y, Hong J. Association between Weight Status and Mental Health among Korean Adolescents: A Nationwide Cross-Sectional Study. *Children (Basel).* 2023 Mar 25;10(4):620. https://doi.org/10.3390/children10040620
13. Davila-Cervantes CA, Luna-Contreras M. Suicide attempts in the adult Mexican population: an analysis of sociodemographic characteristics and associated factors. *Rev Bras Epidemiol.* 2024;27:e240014. https://doi.org/10.1590/1980-549720240014
14. Wagner B, Klinitzke G, Brähler E, Kersting A. Extreme obesity is associated with suicidal behavior and suicide attempts in adults: results of a population-based representative sample. *Depress Anxiety.* 2013;30(10):975-981. https://doi.org/10.1002/da.22105
15. Dong C, Li WD, Li D, Price RA. Extreme obesity is associated with attempted suicides: results from a family study. *Int J Obes (Lond).* 2006;30(2):388-390. https://doi.org/10.1038/sj.ijo.0803119
16. Chang SS, Wen CP, Tsai MK, et al. Adiposity, its related biologic risk factors, and suicide: a cohort study of 542,088 Taiwanese adults. *Am J Epidemiol.* 2012;175(8):804-815. https://doi.org/10.1093/aje/kwr386
17. Crow S, Eisenberg ME, Story M, Neumark-Sztainer D. Are body dissatisfaction, eating disturbance, and body mass index predictors of suicidal behavior in adolescents? A longitudinal study. *J Consult Clin Psychol.* 2008;76(5):887-892. https://doi.org/10.1037/a0012783
18. Zhao Y, Tran A, Mattie H. Unhealthy weight control behaviors and health risk behaviors in American youth: a repeated cross-sectional study. *J Eat Disord.* 2024;12(1):118. https://doi.org/10.1186/s40337-024-01081-1
19. Elovainio M, Shipley MJ, Ferrie JE, et al. Obesity, unexplained weight loss and suicide: the original Whitehall study. *J Affect Disord.* 2009;116(3):218-221. https://doi.org/10.1016/j.jad.2008.12.002
20. Lee SA, Jang SY, Shin J, Ju YJ, Nam JY, Park EC. The Association between Inappropriate Weight Control Behaviors and Suicide Ideation and Attempt among

Korean Adolescents. *J Korean Med Sci*. 2016 Oct;31(10):1529-37. https://doi.org/10.3346/jkms.2016.31.10.1529

21. Ellison C, Philpot U. Confusion between avoidant restrictive food intake disorder, restricted intake self-harm, and anorexia nervosa: developing a primary care decision tree. *Br J Gen Pract.* 2024 Nov 28;74(749):559. https://doi.org/10.3399/bjgp24X740109
22. Jeong J, Kim H, Jo H, Kim HJ, Park J, Cho J, Hwang J, Park S, Pizzol D, Smith L, Rhee SY, Woo S, Yon DK. National Trends in the Prevalence of Suicide Attempts Among Adolescents by Self-Perceived Weight, 2005-2023: A Nationwide Representative Study in South Korea. *Psychiatry Investig*. 2025 Dec 18. https://doi.org/10.30773/pi.2025.0216
23. Schneider B, Lukaschek K, Baumert J, et al. Living alone, obesity, and smoking increase risk for suicide independently of depressive mood: findings from the population-based MONICA/KORA Augsburg cohort study. *J Affect Disord.* 2014;152-154:416-421. https://doi.org/10.1016/j.jad.2013.10.007
24. Mukamal KJ, Miller M. BMI and risk factors for suicide: why is BMI inversely related to suicide? *Obesity (Silver Spring).* 2009;17(3):532-538. https://doi.org/10.1038/oby.2008.538
25. Stanley B, Molcho A, Stanley M, et al. Association of aggressive behavior with altered serotonergic function in patients who are not suicidal. *Am J Psychiatry.* 2000;157(4):609-614. https://doi.org/10.1176/appi.ajp.157.4.609
26. Kelesidis T, Kelesidis I, Chou S, Mantzoros CS. Narrative review: the role of leptin in human physiology: emerging clinical applications. *Ann Intern Med.* 2010;152(2):93-100. https://doi.org/10.7326/0003-4819-152-2-201001190-00008
27. Westling S, Ahrén B, Träskman-Bendz L, Westrin Å. Low CSF leptin in female suicide attempters with major depression. *J Affect Disord.* 2004;81:41-48. https://doi.org/10.1016/j.jad.2003.07.002
28. Ninla-Aesong P, Puangsri P, Kietdumrongwong P, et al. Being overweight and obese increases suicide risk, the severity of depression, and the inflammatory response in adolescents with major depressive disorders. *Front Immunol.*2023;14:1197775. https://doi.org/10.3389/fimmu.2023.1197775
29. Wingren CJ, Ottosson A. Body mass index and suicide methods. *J Forensic Leg Med.* 2016;42:45-50. https://doi.org/10.1016/j.jflm.2016.05.013

30. McCarthy JF, Ilgen MA, Austin K, et al. Associations between body mass index and suicide in the Veterans Affairs Health System. *Obesity (Silver Spring).* 2014;22(1):269-276. https://doi.org/10.1002/oby.20422
31. Ibrahim H, Mahfoud ZR. No Association Between Suicidality and Weight Among School-Attending Adolescents in the United Arab Emirates. *Front Psychol.* 2021 Mar 17;12:618678. https://doi.org/10.3389/fpsyg.2021.618678