



Psychogenetic Features of the Influence of Genes on Human Life

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Key words

Personality; mental health; heredity; cognitive functions; depressive disorders

Abstract

Aim: The purpose of the study is to reveal the relationship between genetic factors and psychological aspects of a person's life. **Materials and Methods:** The paper uses methods of analysis and synthesis, psychological tests, and the interpretation method. **Results:** The role of genetic factors in the development of a person's mental characteristics, such as personality, temperament, and predisposition to certain mental disorders, is analysed. The paper includes an analysis of the heredity of mental traits, the investigation of genetic markers associated with the ability to adapt to stressful situations and the development of mental disorders. The findings confirm that genes can influence various aspects of a person's life, including depressive disorders that are passed down from parents to the next generation. **Conclusion:** Consideration of psychogenetic features can be of practical importance in the fields of psychiatry, psychotherapy, and other areas related to the health of the human psyche. The study results will help expand the understanding of the role of genetics in human mental functioning and the impact of genetic factors on human life and well-being.

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Introduction

Each person has unique and unrepeatable genes as well as those shared by all Homo sapiens. They also represent different cultures, ethnic groups, professional and age groups, families, and more. Thus, studying individual differences is a pressing scientific issue. Professional selection and consultations, individualised training and upbringing, and medical and pedagogical tasks cannot be done without these individual characteristics. Psychogenetic, alternatively referred to as behavioural genetics, is a field of inquiry that examines the impact of genes and the environment on psychological traits, behaviours, and mental processes in both humans and animals. The field of psychogenetic holds significant relevance in comprehending the influence of genetics on the quality of life, as it explores the effects of genetic factors on diverse psychological dimensions that directly impact an individual's overall well-being and satisfaction with life. The aforementioned factors encompass personality traits, cognitive capacities, mental health disorders such as depression and anxiety, and the inclination to manifest specific psychological disorders. Psychogenetic offers valuable insights into the genetic foundations of human behaviour, mental functioning, and the determinants of high quality of life by investigating the interplay between genes and environmental influences in shaping psychological characteristics. [1].

The impact of genetics on quality of life is a significant aspect that attracts the attention of researchers in

the field of psychogenetics. Genetic factors can significantly influence various aspects of an individual's quality of life, including mental health, cognitive abilities, personality traits, and susceptibility to certain diseases, thereby underscoring the importance of understanding the intricate interplay between heredity and environmental influences. For example, some genetic variations may increase the risk of developing psychiatric disorders such as depression, autism spectrum disorders, and schizophrenia [2]. Other genes may be associated with the ability to develop cognitive function, memory, attention, and other mental functions. Genetics are also known to influence physical resistance, predisposition to chronic diseases, and other aspects of physical health [3,4].

Among the modern researchers of Ukraine, Pomogaibo and Karapuzova examined the influence of genetics on the occurrence of phobic disorders, obsessive-compulsive disorder (OCD), attention deficit hyperactivity disorder (ADHD), epilepsy, and its role in the development of abilities and talents of individuals [5]. In particular, they noted that about half of the variation in mathematical abilities depends on genetic factors, while the remaining influence on this trait is determined by environmental factors that vary depending on the age of the child.

Rybalka was also engaged in similar research and determined that psychogenetic and psycho-pedagogic foundations allow a person to be included in the civilizational process of personal and human development [6]. In the presence of appropriate psychogenic factors, the child's giftedness does not fade away; it actively and productively develops throughout life. Due to qualified psycho-pedagogic support in childhood and adolescence, giftedness is practically realised in youth and adulthood, based on systematic work, professionalism and skill, which allows moving from giftedness to talent and genius.

Lysytsia raised the question of the influence of heredity on the cognitive processes of the human brain, features of its evolution and functioning [7]. In particular, it is noted that the development of modern technologies, such as nanomedicine, genomics, neurones, bioinformatics, pose such problems as a conscious influence on the human genome for the treatment of diseases, gene therapy, increasing the duration of active life, improving the human genome, creating an "ideal child", using hereditary mechanisms to solve important social, economic, moral issues, searching for genes that determine personality, behaviour, psyche, cognitive abilities, and other aspects. Therefore, this may be a new challenge for psychologists in the future.

Identifying the relationship between genetic factors and psychological aspects that have a direct impact on

a person's life and quality is the purpose of the study. A number of tasks were completed:

1. The paper analysed genetic factors that affect various psychological aspects of a person's life, in particular, their behaviour, personality traits, and cognitive abilities.
2. The relationship between genetic variations and the occurrence of certain psychological conditions, such as the risk of developing mental illnesses and emotional stability, was investigated.
3. An assessment of the influence of genetic factors on individual development and adaptation of the individual to the external environment was provided.
4. The role of genetic markers in determining the influence of genes on psychological processes and human quality of life was established.

Materials and Methods

To achieve the goals of the research, several methods were used to analyse how much human genes affect various aspects of a person's life: psychological, psychophysiological, and cognitive. Using methods of analysis and synthesis, theoretical and scientific aspects were considered, which revealed the essence of psychogenetics, the main genetic factors of influence on humans, the nature of their manifestation in heredity, and the main consequences for subsequent generations. The theoretical data obtained as a result of the study became the basis for subsequent searches for genetic influences on various aspects of human development. Due to the active increase in the level of depressive disorders in the world, which have a negative impact on the mental state and standard of living of people, causing them suffering, a hypothesis has been put forward about the genetic basis of depressive states, which is transmitted through subsequent generations. Therefore, a study was conducted on the presence of depression, anxiety, and their level among respondents whose parents had a history of these diagnoses. 100 people aged 18 to 40 years were invited to participate in the study, divided into two identical groups:

1. Group 1: subjects whose parents had a history of depressive disorders according to the ICD-10 diagnostic criteria, such as depressive episode, bipolar affective disorder, recurrent depressive disorder, and moderate to severe adaptive reaction disorders, as well as their previous treatment in a psychoneurological dispensary.
2. Group 2: subjects whose parents did not have depression. The survey was conducted through a written questionnaire.

The criterion for including patients in the study groups was the conscious consent and signature of the informed consent form to participate in the study. The researcher made the deliberate choice to omit the gender and race of the patients from the experiment. Furthermore, to optimise the precision

of the findings, the investigator opted to exclude patients who had pre-existing medical conditions (e.g., somatic illnesses) that could have induced symptoms of depression or anxiety, as well as those who were currently diagnosed with severe psychiatric disorders that could have impeded their capacity to provide informed consent for participation. The author informed the participants about the anonymous and voluntary participation, and the participants provided their consent.

Stage 1: The Hospital Anxiety and Depression Scale (HADS) was used to identify possible depressive symptoms. This scale allows assessing the severity of symptoms of anxiety and depression through self-completion. HADS is known for its ease of use and processing, so its application is suitable for testing initial levels of anxiety and depression. The advantage of the technique is that the symptoms of depression and anxiety were excluded, and they can be mistaken for manifestations of somatic diseases, such as headaches or dizziness. Depression-related items were selected from a list of complaints and symptoms with the highest prevalence, which shows a predominantly anhedonic component of depressive disorder. Anxiety-related items were drawn from a standard clinical interview. The scores from the depression-related items were totalled to provide a depression score for each participant. The goal was to use the technique to determine whether the number of respondents with symptoms of depression in both groups differs to determine the possible influence of the psychogenic factor on their detection.

Stage 2: By utilising standardised diagnostic criteria, the method of Differential diagnosis of depressive states guarantees the precise identification and evaluation of the severity of depressive states among the participants. By employing established protocols, the researcher assesses the symptoms and behaviours of the participants that are indicative of depression. By employing this methodology, it becomes possible to compare the levels of depression demonstrated by participants from both cohorts who displayed symptoms in the preliminary evaluation stage. The purpose of this study is to ascertain whether a correlation exists between genetic inheritance and the severity of depressive states by comparing individuals with and without a family history of depression. By employing the differential diagnosis approach, a thorough and methodical assessment is conducted, thereby augmenting the dependability and accuracy of the research outcomes concerning the genetic correlation with depressive disorders.

Stage 3: Diener and associates developed the Satisfaction with Life Scale (SWLS), a widely recognised psychological assessment instrument, to quantify the overall life satisfaction of individuals [8]. The SWLS questionnaire is completed by participants from both study groups. It comprises items that evaluate different dimensions of life satisfaction, including personal fulfilment, relationships, and achievement. By employing the interpretive approach, scholars juxtapose the SWLS scores of participants with those derived from established theoretical frameworks and other pertinent investigations. This comparative analysis facilitates the identification of trends and

patterns in the life satisfaction of those who have a genetic predisposition to depression versus those who do not. Through an analysis of the similarities and distinctions in levels of life satisfaction between the two cohorts, scholars acquire valuable knowledge regarding the possible impact of genetic elements on the overall standard of living. This phase provides valuable insights into the intricate relationship between genetic predisposition and subjective well-being, which in turn guide future research endeavours and inform interventions designed to improve the mental and emotional health of individuals.

Anxiety and depression are prevalent mental health conditions that impose substantial personal and societal costs. This raises the issue of “Does having parents with a history of depression and anxiety increase the risk of developing these conditions in offspring?”. Gaining insight into the genetic underpinnings of these disorders may facilitate the identification of susceptible individuals and the formulation of precise preventive and therapeutic approaches. Furthermore, this investigation may provide insight into the intricate dynamics that occur between genetic and environmental elements during the progression of mental health conditions. All procedures performed in the study were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments.

Results

Psychogenetic factors influence personality and development through a variety of psychological and genetic influences. The main psychogenetic factors are several [1]. The main ones are genetic. Genetics can affect a person’s intellectual abilities, personality traits, propensity for mental disorders, and other mental functions. Social factors (family, native environment, cultural, and social norms) impact human development. Social influences like parents, peers, upbringing, education, and others can shape a person’s personality, values, attitudes, and behaviour. Individual characteristics, psychological reactions, perception, thinking, emotions, and other mental processes influence personality development. Experience, parenting, attachment styles, and self-awareness can affect emotional well-being. Biological processes like brain structure, chemical reactions, and hormonal balance affect mental development. For instance, neurotransmitter disorders affect mood and emotion. These factors influence a person’s development throughout life [9].

Today, much scientific research shows that genetic and environmental variations interact to shape individual behaviour and health. The studies showed that genetic and environmental interactions affect gene expression through epigenetic processes [10]. Stressful early environments, constant stress, and acute stress can impair normal development, including health and behaviour.

Genetics can increase or decrease exposure to harsh environments. A person's well-being and life satisfaction are affected by many qualities of life factors. Joy, contentment, and happiness affect psychological well-being. Managing negative emotions and stress, positive self-perception, belief in personal abilities, and environmental satisfaction are also important psychological quality of life factors. High-quality social relationships, support from family, friends, and community, and the ability to cope with stress and adapt to life's challenges and negative events improve psychological well-being and belonging.

Depression and anxiety are common and correlated mental symptoms that burden the world and affect life quality. Major depressive disorder (MDD) is a complex mental illness that causes low mood, loss of joy, low self-esteem, guilt, impaired appetite or sleep, energy loss, and suicidal thoughts. This disorder is a leading cause of disability worldwide. Heritability of nonrefractory depression (NDD) is 30-50 %, and genetic, environmental, and psychological factors cause MDD [11,12]. Genetics and life experiences define depression [13]. The molecular signature of perineuronal networks closing the sensitive period protects against oxidative stress. Childhood problems affect oxidative stress responses and MDD pathophysiology. Deficits in γ - aminobutyric acid (GABA) transmission, which regulates the sensitive period, can alter early life stress levels. Thus, stress during vulnerable developmental periods can worsen depression, especially in people with sensory impairment genetic variations [14]. This data was used to study how depression is passed down from parents to children and how it affects their quality of life.

According to the results of the HADS, Group 1 (parents with depressive disorder) has a higher frequency of depressive states compared to Group 2 (parents without depression). This may indicate some heredity of depression,

as children whose parents have depressive disorder are more likely to develop depression themselves. In Group 1, both subclinical and clinical manifestations of depression/anxiety are observed, which may indicate a wide range of manifestations in this group of people. Group 2 also has cases of subclinical and clinical manifestations of depression/anxiety, but their frequency is lower compared to Group 1. This may mean that the presence of depressive disorder in parents can increase the risk of depression in offspring, but it is not the only determining factor (Figure 1).

The method of Differential diagnosis of depressive states provided more detailed data on the levels of depression in respondents. In both groups, there is a difference in the severity of depression, ranging from minor or absent depression to deep depression. Both groups have some cases of depression, even if that depression is minor or minimal. This may indicate a general predisposition to depressive states in these groups. The group with parents with the depressive disorder had a higher number of severe and deep depressions compared to the group without depression. This may indicate a certain hereditary predisposition to severe forms of depression (Figure 2).

Both methods confirm the presence of depressive states in Group 1, compared to Group 2. In both cases, there is a certain number of people with severe and moderate depression. According to the method of Differential diagnosis of depressive states, a greater variety of depression severity is detected in each group. This may indicate a more detailed detection of the severity of depression in recipients. The results of the Satisfaction with Life Scale (SWLS) method showed that both groups have different levels of life satisfaction. In Group 1, there are more dissatisfied and extremely dissatisfied people than in Group 2. Group 2 has more people who express satisfaction with life and are almost satisfied

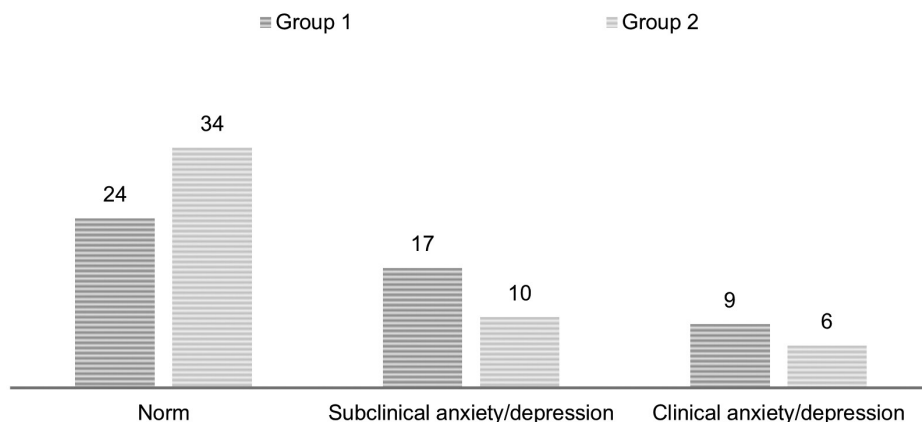


Figure 1. Results of the Hospital Anxiety and Depression Scale

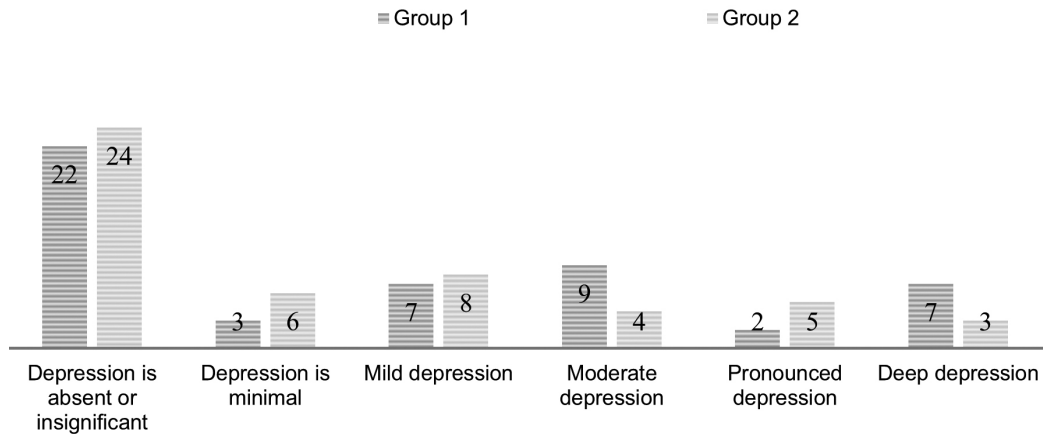


Figure 2. Results of the method of Differential diagnosis of depressive states

with their lives, compared to Group 1. In Group 1, there are more people with neutral responses, that is, those who are undecided about their level of life satisfaction.

Based on these three methods, SWLS showed that respondents with depressed parents were more dissatisfied with life. This may indicate that hereditary depression is affecting this group's overall positive outlook. HADS and differential diagnosis of depressive states may explain SWLS's lower life satisfaction. Overall, respondents with inherited depression are more likely to develop depressive states, which can lower life satisfaction. Further research and consideration of environmental and social factors that may affect depression and life satisfaction are needed to draw more accurate conclusions and understand the relationship between these results [15].

Due to their role in brain and nervous system development, genes can affect a person's psychology. They control brain chemical balance, stress response, and other mental disorder-related mechanisms. New and powerful human genetics help identify rare and common variants that cause diseases and disrupt nervous system

development. Discovering the genetics of mental disorders has advanced over the past decade. There is strong evidence that psychiatric disorders are "polygenic"—many genetic loci, mostly with little effect, increase risk [16]. Polygenicity suggests that some people have significant genetic variations. Approximately 15 % of cases of autism spectrum disorder (ASD) show a significant effect. Like schizophrenia and ADHD, Tourette's syndrome (TS) is rare. Genetic data are the most important open biomarkers for most psychiatric disorders.

Genes also affect personality and temperament [17]. Some genes determine extraversion, neuroticism, agility, and other traits that affect psychological responses and worldview. Personality depends on genes that regulate and coordinate dynamic functions needed to adapt to changing circumstances [18,19]. These genes regulate nervous system development, neuroplasticity, neurogenesis, neurotransmission, stress response, energy metabolism, neuroprotection, resilience, and healthy longevity. Brain expression of personality genes is nearly universal. However, genetic variability regulates pathways that are

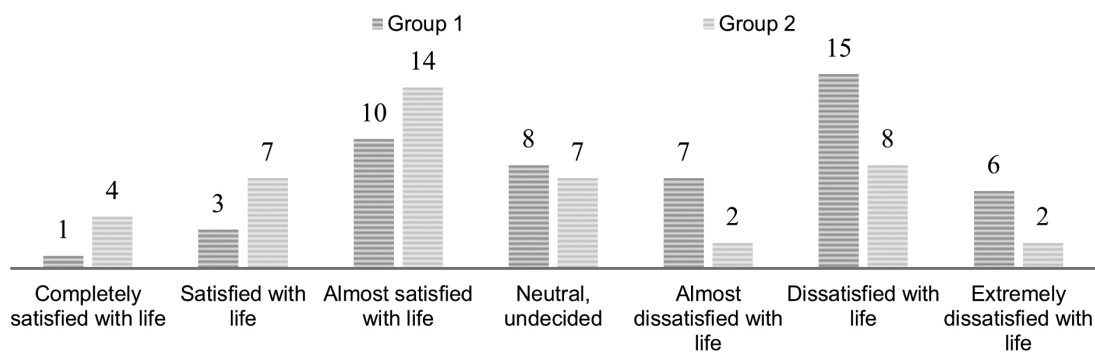


Figure 3. Results of the Satisfaction with Life Scale

important for the brain and include common cell type functions like energy metabolism, circadian rhythms, and cell regeneration [20-22].

Psychogenetic factors can affect talent and abilities, but the mechanism is unknown. Talent is a complex mix of genetic, environmental, and training factors that determines success in music, art, science, and sports. Genes affect physical traits that may help develop sports talent. Understanding physiological processes has opened up new ways to improve performance by manipulating genes and gene expression. This controls enzyme and protein production, which is vital to human life. These new abilities enable more precise regulation of body processes and improve performance [23].

Certain genes can affect muscle structure or the nervous system, affecting athletic or musical talent. They also affect intelligence, memory, and creativity. Intelligence is complex and genetic. Genome-wide association studies found thousands of DNA variants. These choices affect intelligence. Intelligence is a good predictor of mental health, physical health, educational and career success. Twin studies showed that intelligence is 60 % to 80 % heritable, making behavioural genetics ideal for studying intelligence [24]. Psychogenetic factors can provide a foundation for psychological, biological, psychophysiological, and other aspects of human life, which, along with sociocultural, economic, and psychological factors, affect quality and satisfaction.

Discussion

Genes play an important role in determining various aspects of a person's quality of life. Quality of life can be affected by both inherited and acquired factors and genes play a role in both cases. Inherited genes can have an impact on many physiological and psychological aspects of quality of life. For example, certain genes can influence the predisposition to develop various diseases, such as cancer, heart disease, or diabetes. Other genes may influence individual drug responses, which may be important for a person's quality of life [25].

The study sheds light on the problems of the influence of genes on the psychological state of a person, in particular, about depression, which can determine the entire further behaviour and life of an individual. Depressive disorders are one of the main causes of disability, suicidal behaviour, and a decrease in the quality of life [26]. They affect 20 % of the population [27]. Family and genealogical studies conducted at the turn of the 20th-21st centuries revealed the inheritance rates of depression at the level of 40-70 %. They have shown that there are genetic components in the development of depressive disorders [28]. The development of molecular

genetic methods marked the beginning of the identification of genes that show a predisposition to depressive disorders. This was done by analysing loci that control the levels of neurotransmitters such as serotonin, dopamine, and glutamate [29].

Uher and Zwicker noted that depressive disorders, bipolar disorder, schizophrenia, and autism are the most expensive and disabled diseases [30]. Physical illnesses, premature deaths, and childhood exposure are associated with them. They found that pathology is heritable throughout life by studying long-term cohorts. Most mental illnesses start in childhood and adolescence, often due to anxiety [31]. Neither genetic variant nor environmental factor alone causes mental disorders, but rather their interaction. As reported in the paper, two groups of respondents had similar results. The group whose parents had depressive disorders and were treated in specialised institutions had more depression and more severe symptoms than Group 2. The genetic component of the psychological disorder affected parents and children in the future.

Zhu and associates found a statistical link between physical or emotional abuse in childhood between 1 and 5, including the genetic risk of depression, which is determined by genes that open sensitive periods [14]. Changes in sensory period genetic pathways affect brain region development and mental vulnerability. Molecular studies suggest genetic sensory plasticity dysregulation may cause neuropsychiatric disorders. Zhang and associates also found a genetic link between post-traumatic stress disorder (PTSD) and depressive phenotypes and identified new PTSD genes [32]. Genetic variations are inherited and constant, making them reliable and objective factors that reflect a trait's pathophysiological basis rather than its symptoms.

Bondy studied the genetic factors that link depression and cardiovascular disease (CVD), the two most common disorders in developed countries and directly affect quality of life [33]. The researcher stressed that heart disease strongly affects mood and vulnerability is unidirectional. Psychological mechanisms, mostly biological, form predisposing factors, mostly genetic ones. The researcher noted that depression and CVD can co-exist with common genetic factors even without mutual influence. Depression and CVD are complex diseases with many causes, so they may have the same genetics [34]. They interact or have a total effect, adding environmental factors.

Hebebrand and associates found that metabolic variability affects character, psychological traits, and disorders [35]. About 5-10 % of genomic regions are linked to BMI and mental phenotypes. Metabolic loci are linked to BMI, Alzheimer's, schizophrenia, and education [36]. Distel and associates found gene-environment interac-

tion in 2010 [37]. They found that sexual violence and additive genetic influences on mental disorders interact. However, affected people have less genetic diversity. Psychological disorder symptoms are less heritable in survivors of divorce/separation, violent assault, sexual assault, or job loss due to their greater diversity [38]. Some life events are linked to genes and environment. The researchers found that genes that affect mental disorder symptoms also increase the risk of certain life events.

Marees and associates remarked that it is important to investigate the genetic relationship that exists between socioeconomic status and mental health [39]. The researchers evaluated genetic similarities between nine psychiatric disorders and seven substance use traits. They were able to detect significant changes in genetic relationships after separating the genetic variation associated with socio-economic status. The survey of two groups of respondents on the heredity of depression presented in the paper also looked at the impact of genetic factors on mental health and considered socio-economic status as a potential modifier of this impact. Such approaches help better understand the genetic architecture of mental health and its relationship to the environment.

According to the paper's research, genetic influences can interact with life events like sexual violence, divorce/separation, violent attacks, and job loss to worsen mental disorder symptoms. In the study of two groups of respondents, depressive disorders' impact on quality of life may be the result of genetic factors influencing mental disorder symptoms and important life events like violence, stressful situations, or loss. Thus, genetic factors can increase vulnerability to depressogenic events and cause depression and mental suffering, lowering quality of life. Thus, while genes can affect quality of life, understanding the interaction of genetics, environment, and other factors is necessary to fully assess this impact. Therefore, this topic warrants further study.

To maintain scientific rigour and provide direction for future research endeavours, the following limitations have been identified that may assist future research:

The study sample comprised 100 participants, ranging in age from 18 to 40, who were divided into two distinct groups. Although the sample size employed in this study is deemed reasonable, it may not comprehensively encompass the wide range of genetic and environmental factors that impact depressive disorders and overall quality of life. Furthermore, it is important to note that the research was carried out within a limited geographic scope, which may limit its applicability to broader populations characterised by diverse cultural, social, and economic contexts.

Self-report measures were utilised in this study to evaluate depressive symptoms and life satisfaction. Spe-

cifically, the Hospital Anxiety and Depression Scale (HADS) and the Satisfaction with Life Scale (SWLS) were employed for this purpose. Social desirability bias and response bias are among the biases that can affect self-report measures. To enhance the comprehensiveness of mental health assessments, future research endeavours may consider the integration of objective measures and diagnostic interviews administered by trained professionals.

So, to enhance the understanding of the intricate relationship between genetics and quality of life, it is recommended that future research adopts an integrative and multidisciplinary methodology. There is a need for more extensive longitudinal studies that investigate a wide range of populations throughout their entire lifespan. To comprehensively examine well-being, these studies must encompass a diverse array of genetic markers, psychological traits, and behavioural phenotypes. Additionally, it is crucial to consider potential environmental moderators such as socioeconomic status and life events.

Since genes regulate various aspects of brain structure and function, they can affect cognitive abilities, emotional state, behaviour, perception of the world, the overall psychological component of life, and its quality. For example, genetic variations may be associated with an increased risk of developing mental disorders and influence the propensity to become addicted to psychoactive substances. On the other hand, some genes may be associated with improved cognitive function, creativity, musical talent, or other types of giftedness. Genetic factors can also influence the ability to adapt to stress and order, which is essential for mental well-being and the ability to adjust to different life situations.

The results of a survey of two groups of recipients indicate the psychogenetic impact of depressive disorders on the quality of life. People whose parents had a history of depressive disorder experienced greater dissatisfaction with life compared to those whose parents did not have depression. In the group with depressed parents, a higher percentage of people have moderate to severe depression, which indicates a psychogenetic predisposition to depression in children. Research on psychogenetic features contributes to a better understanding of the relationship between genetic and psychological factors in determining the quality of life. They help identify specific genes and genetic markers that may be associated with certain aspects of quality of life, such as emotional well-being, relationship satisfaction, self-esteem, and life satisfaction.

Understanding how genetics affects life quality is useful. It can help develop individualised medical and psychological interventions, disease prevention, and quality of life improvements for certain groups. It can help de-

velop genetic tests to predict vulnerability to certain conditions or treatment responses, enabling personalised medical therapy. Therefore, studying the psychogenetic aspects of genes' effects on quality of life helps explain the complex relationship between genetic and psychological factors and can improve people's physical and mental health. Further research may examine genetic mechanisms and variations associated with psychological traits and mental health, as well as how genetic factors affect personality development and behaviour.

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Conflict of interest

None to declare.

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