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THE ROLE OF DIET, PHYSICAL ACTIVITY AND SLEEP HYGIENE IN THERAPY AND PREVENTION OF MENTAL DISORDERS

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ABSTRACT

Aim: This narrative review presents current evidence on the influence of diet, physical activity, and sleep hygiene on the prevention and management of mental disorders. The goal is to identify modifiable lifestyle factors that can support psychiatric care and reduce symptom burden in conditions such as depression, anxiety, schizophrenia, dementia, and bipolar disorder.

Methods: A non-systematic literature review was conducted using international scientific databases, focusing on publications from 2015 to 2024. Emphasis was placed on studies addressing biological mechanisms, clinical outcomes, and practical applications of nutrition, exercise, and sleep-related interventions in mental health.

Results: Dietary patterns rich in polyunsaturated fatty acids, antioxidants, vitamins, and fiber—such as the Mediterranean and anti-inflammatory diets—have been associated with improvements in mood, cognitive function, and treatment response in depression and schizophrenia. Ketogenic and low-carbohydrate diets may influence neurochemistry and inflammation, though evidence remains inconclusive. Regular physical activity is associated with enhanced neuroplasticity, reduced inflammation, and improved emotional regulation. Different exercise modalities, including aerobic and resistance training, have demonstrated benefits across a range of psychiatric conditions. Adequate sleep hygiene, through regulation of circadian rhythms and minimizing sleep disturbances, plays a critical role in mental health maintenance and relapse prevention.

Conclusions: Diet, physical activity, and sleep hygiene are modifiable lifestyle components with established and emerging roles in the prevention and therapy of mental disorders. Their integration into psychiatric care may enhance treatment outcomes, reduce relapse risk, and support overall mental well-being. Further studies should define optimal interventions, ensure feasibility in clinical settings, and address population-specific needs.

Keywords: mental disorders, depression, nutrition, exercise, sleep hygiene, lifestyle

INTRODUCTION

Mental health disorders have become a growing public health concern worldwide. While such conditions have accompanied human societies for centuries, recent decades have seen a significant increase in both their prevalence and recognition. Epidemiological data indicate a steady rise in the incidence of depression, anxiety,

bipolar disorder, and psychotic illnesses, particularly in industrialized societies. This trend is attributed not only to improved diagnostic awareness but also to the accelerating pace of life, reduced interpersonal contact, and lifestyle changes associated with modern technologies [1,2].

The digitalization of work and communication, including the widespread adoption of remote work, has contributed to decreased social interaction and increased feelings of isolation. At the same time, sedentary behaviour and insufficient physical activity are becoming increasingly common, with well-documented consequences for both physical and mental health [3]. Chronic stress, poor sleep quality, and reduced nutritional quality further exacerbate emotional dysregulation, cognitive dysfunction, and vulnerability to psychiatric disorders [4,5].

The contemporary lifestyle often involves prolonged exposure to artificial light, irregular circadian rhythms, and reliance on highly processed foods lacking essential nutrients. These environmental and behavioural factors interact with neurobiological mechanisms, influencing the development and course of mental illnesses. In Poland, lifestyle-related risk factors such as poor dietary habits, insufficient physical activity, and obesity are becoming increasingly prevalent. According to recent national epidemiological data, more than 60% of adults in Poland are overweight or obese, and a significant proportion report low levels of physical activity [55, 56, 57]. These behavioural determinants not only increase the risk of chronic somatic diseases but are also strongly associated with higher prevalence of depression and anxiety disorders.

Increasing evidence supports the hypothesis that modifiable lifestyle components—including diet, physical activity, and sleep hygiene—play a critical role not only in the prevention but also in the adjunctive treatment of mental disorders [7–9]. This review aims to summarize current knowledge on the associations between nutrition, physical activity, and sleep hygiene and the pathophysiology and clinical outcomes of mental health conditions. The review highlights mechanisms involved in these interactions and discusses practical implications for prevention and therapy.

METHODS

This narrative review summarizes current knowledge on the relationship between diet, physical activity, sleep hygiene, and the prevention of mental disorders. The literature search was conducted in PubMed and Google Scholar databases, focusing on original and review articles published between 2015 and 2024. The following keywords were used individually and in combination: "mental disorders", "healthy lifestyle", "sleep", "physical activity", "diet", and "prevention". Only English-language publications relevant to non-pharmacological approaches to mental health care were considered.

RESULTS AND DISCUSSION

The analysis of selected publications confirmed that non-pharmacological strategies—particularly balanced nutrition, appropriate sleep hygiene, and regular physical activity—play a significant role in supporting mental health. These modifiable lifestyle factors are associated with improved emotional regulation, stress resilience, cognitive performance, and overall psychological well-being.

MULTIFACETED NATURE OF THERAPY FOR MENTAL DISORDERS

The increasing recognition of the complex etiology of mental disorders has led to a growing emphasis on interdisciplinary and integrative approaches in psychiatric care. These disorders are influenced by a wide range of biological, psychological, and environmental factors; therefore, effective management requires not only appropriately selected pharmacotherapy and psychotherapy but also the incorporation of health-promoting lifestyle interventions. Among these, diet, physical activity, and sleep hygiene are recognized as key modifiable components with significant influence on both prevention and treatment outcomes.

A substantial body of research highlights the impact of individual nutrients on mental health. The majority of studies in this area have focused on the effects of specific vitamins (particularly B9, B12, B6, C, D), amino acids (tryptophan, phenylalanine, tyrosine, methionine, glycine, taurine), and minerals (such as magnesium and iron), as well as omega-3 fatty acids. Supplementation with these compounds has been shown to alleviate symptoms or reduce the risk of depression, bipolar disorder, and schizophrenia [1,2].

The role of sleep in mental health has also been extensively studied. Evidence confirms that maintaining proper sleep hygiene contributes not only to the alleviation of psychiatric symptoms but also to overall therapeutic effectiveness. Cognitive behavioral therapy for insomnia (CBT-I) is an established, non-pharmacological treatment modality with demonstrated efficacy in the management of insomnia, depression, anxiety, and other mental disorders [3]. Furthermore, poor sleep quality has been associated with an increased risk of metabolic conditions such as obesity, type 2 diabetes, and cardiovascular disease, which frequently co-occur with psychiatric illness [4].

Adequate sleep is also essential for sustaining regular physical activity, which plays an important role in individuals with hypertension, metabolic disorders, obesity, and depressive symptoms [5]. Physical activity is

positively associated with psychological well-being and quality of life [6]. Its antidepressant and anxiolytic effects are attributed to improved cerebral blood flow, enhanced neurogenesis and synaptic plasticity, and increased delivery of oxygen and nutrients to brain tissue [7]. Epidemiological studies indicate a significantly lower risk of developing depression among individuals who engage in regular physical activity [8].

These findings underscore the multifactorial nature of mental disorder management and the importance of integrating lifestyle-based interventions—particularly diet, physical activity, and sleep hygiene—into comprehensive mental health strategies.

DIET

1. Importance of nutrition for physical and mental health

Proper nutrition is essential for maintaining metabolic balance and supporting both physical and mental health. In addition to providing energy and vital nutrients, eating plays an important psychosocial role in emotional regulation and social interaction (9). National and international dietary guidelines, including the Polish Pyramid of Healthy Nutrition and Lifestyle, emphasize a balanced diet as a core element in disease prevention and mental well-being, based on the latest epidemiological data and nutritional science [10,11].

Contemporary dietary recommendations call for minimizing the intake of saturated fats, added sugars, and salt, with the use of herbs as substitutes. A healthy dietary pattern includes the daily consumption of at least 400 grams of fruits and vegetables, a reduction in red and processed meat, and increased intake of fish, legumes, seeds, and eggs. Daily hydration of 2–2.5 liters, mostly in the form of water, and limiting alcohol intake are essential to maintaining cognitive and emotional function. Structured eating habits—regular meals in moderate portions—and the inclusion of whole grain cereals and fermented dairy products such as yogurt or kefir are additional components of health-supportive nutrition [11]. Daily physical activity of 30–45 minutes at moderate intensity is recommended as a complementary factor to diet for maintaining physical and mental resilience [12].

2. Evolution of nutrition science and its impact on health

Progress in nutritional science has led to the identification of essential nutrients and their specific physiological roles. Nutrients such as proteins, carbohydrates, fats, micronutrients, and vitamins influence human metabolism and cognitive function in various ways. Numerous studies have demonstrated that inadequate, unbalanced, or overly restrictive diets can contribute to the development of physical illnesses and mental disorders [13].

3. Contemporary nutritional issues and mental health

The prevalence of overweight and obesity is increasing globally. Modern diets are often high in energy but poor in essential nutrients. Although calorie intake may be excessive, there is often insufficient consumption of B vitamins, zinc, and magnesium, which are important for nervous system function. At the same time, intake of fiber-rich vegetables and whole grains remains below recommended levels. These dietary patterns, when combined with smoking, physical inactivity, and excessive alcohol use, increase the risk of chronic diseases and negatively affect mental health.

4. Diet as an adjunct to psychiatric treatment – a nutripsychiatry perspective

In previous decades, the role of nutrition in psychiatric treatment was underestimated. Today, the emerging field of nutripsychiatry explores the impact of dietary patterns and specific nutrients on brain function and mental disorders. Factors such as urbanization, changes in the food industry, and lifestyle shifts highlight the relevance of dietary behavior in mental health. The brain requires a continuous supply of amino acids, fatty acids, vitamins, and minerals to function properly. Numerous studies confirm the relationship between dietary habits and the incidence of depression and other psychiatric disorders [14,15]. The antioxidant defense system, which depends on adequate nutrient intake, plays an important role in this context [16,17]. Healthy dietary patterns are associated with a lower prevalence of depression [18] and suicide risk [19].

5. The role of supplementation and individual nutrients

Randomized trials have investigated the effectiveness of dietary changes and targeted supplementation in psychiatric disorders (20). S-adenosylmethionine (SAM), N-acetylcysteine (NAC), zinc, B vitamins (including folic acid), vitamin D, and omega-3 fatty acids have shown beneficial effects in the treatment of depression, bipolar disorder, schizophrenia, and obsessive-compulsive behaviors [21–24]. Zinc modulates cytokines and neurogenesis via brain-derived neurotrophic factor. Folate and vitamin B12 support neurotransmitter synthesis and methylation pathways. Low levels of vitamin D have been associated with an increased risk of depression and schizophrenia.

6. Childhood nutrition and its impact on mental development

Early childhood is a critical period for neurodevelopment. Environmental factors, including diet, significantly influence the brain's development. Studies have shown that breastfeeding and high-quality nutrition during the first year of life are associated with improved cognitive outcomes at age 17 [25].

7. Mediterranean diet as a nutrition model to support mental health

Epidemiological studies indicate that diets high in saturated fats and sugars, such as the Western diet, are associated with increased risk of depression [26]. In contrast, the Mediterranean diet, which includes fish, seafood, legumes, vegetables, olive oil, nuts, and fermented dairy is associated with reduced risk of mental illness. Fruits and vegetables provide fiber, vitamins (C, B), carotenoids, and minerals (potassium) that support mood regulation and neuroprotection. Studies recommend more than the standard 400 grams of vegetables and fruits per day for optimal health outcomes [27].

8. Effects of dietary interventions on depression – a review of clinical trials

Recent trials demonstrate that dietary modification can reduce depressive symptoms. Stahl et al. (28) conducted a randomized study involving 122 older adults, showing a 40–50% improvement in depression scores after two years of dietary intervention. Sánchez-Villegas et al. [29] found that a Mediterranean diet enriched with nuts reduced the risk of depression in patients with type 2 diabetes by 41%. Other studies indicate that depressive individuals may consume more sugary and fatty foods, which negatively affect gut microbiota and mood regulation.

Table 1. Key Nutrients and Their Effects on Mental Health

Nutrient	Key Functions & Effects on Mental Health
Omega-3 Fatty Acids	Anti-inflammatory and neuroprotective- Support neurotransmitter function- Reduce symptoms of depression
Zinc	Modulates cytokine activity- Affects neurogenesis and BDNF levels- Mood stabilization in depression
Magnesium	Supports nervous system function- Reduces anxiety and depressive symptoms
Vitamin B Complex	Essential for neural tissue function- Folate (B9) deficiency linked to depression- Supports mood and energy
Folic Acid (B9)	Deficiency linked to depression- Improves response to antidepressants
Vitamin B12	Maintains nerve cell health- Helps produce serotonin
Vitamin D	Low levels linked to depression and schizophrenia- Supports immune and brain function
S-Adenosylmethionine (SAM)	Participates in methylation processes- Shows antidepressant effects in studies
N-acetylcysteine (NAC)	Antioxidant and anti-inflammatory- Improves outcomes in schizophrenia, bipolar disorder, trichotillomania
Iron (implied)	Important for cognitive function and oxygen transport in the brain
Vitamin C	Antioxidant support- Aids in neurotransmitter synthesis
Carotenoids	Antioxidant properties- May protect against neurodegenerative changes
Complex Carbohydrates	Stabilize blood sugar levels- Help regulate mood
Fiber	Supports gut-brain axis- Improves gut microbiota which influences mood

Potassium	Supports nerve function and mood regulation

PHYSICAL ACTIVITY

1. Definition and Classification

Physical activity is defined as any movement produced by skeletal muscles that results in energy expenditure above resting levels [30]. It plays a central role in the prevention and treatment of non-communicable diseases and is a core component of a health-promoting lifestyle alongside balanced nutrition and adequate sleep [31]. Physical activity is commonly categorized into aerobic and anaerobic forms and may be further classified by intensity using metabolic equivalents (METs) [32].

Table 2. Types of Physical Activity Based on MET

Type of effort	MET range	Examples of activity
Slight	below 3,0 MET	Lying down, sitting, walking quietly
Medium	3,0 - 6,0 MET	Work in the garden, a quick walk
Intensive	over 6,0 MET	Running, cycling, heavy physical work

Exercise can be divided into light, moderate and intense. For this purpose, a unit of MET (metabolic equivalent) is used, which corresponds to the energy expenditure of a person while sitting quietly. [29]

Table 3. Physiological Classification Based on Intensity

Type of activity	Description	Heart rate range maximum 220-age	Exercise examples
Aerobic exercises	Aerobic burning of energy for muscles - enables fat reduction	55-85% of maximum heart rate	Dancing, cycling, walking
Anaerobic exercise	The anaerobic process of obtaining energy for muscle work.	80-90% of maximum heart rate	Sprinting, high-intensity interval training, power triathlon

2. Global Recommendations

According to the WHO 2020 guidelines [33]:

- Children and adolescents (5–17 years): average 60 min/day of moderate to vigorous aerobic activity, with muscle- and bone-strengthening at least 3 days/week.
- Adults (18–64 years): 150–300 minutes/week of moderate-intensity or 75–150 minutes/week of vigorous-intensity aerobic activity, or an equivalent combination.
- Older adults (65+ years): Same as adults, with additional focus on functional balance and strength training.

3. Effects on Physical and Cognitive Health

Regular physical activity significantly reduces the risk of cardiovascular diseases and overall mortality [34, 36]. Meta-analytic evidence suggests a nearly 40% reduction in the risk of Alzheimer's disease and other dementias among physically active individuals [35].

4. Neurobiological Mechanisms

Exercise enhances neuroplasticity and cognitive performance through several pathways. A 24-week moderate-intensity aerobic training program in older adults (aged 65–95) led to improved attention and reductions in

systemic inflammation and oxidative stress [37]. Physical activity also stimulates the expression of brain-derived neurotrophic factor (BDNF), angiogenesis, and synaptogenesis in regions such as the hippocampus and cortex [38, 39]. Increased cerebral blood flow in the dentate gyrus has been linked with cognitive resilience [40]. One study involving 58 males (aged 20–39) showed that moderate-to-vigorous exercise improves stress adaptability more effectively than low-intensity activity, though its findings are limited by small sample size and self-reported measures [41].

5. Depression Prevention

Physical activity lowers depression risk across age and demographic groups. A meta-analysis of 49 studies involving over 260,000 participants found that greater objectively measured physical activity was associated with a 17% lower risk of depression [42]. Mendelian randomization studies involving over 611,000 individuals confirmed a causal protective role of physical activity in depression prevention (43). Additional findings show that exercise mitigates depression risk regardless of genetic predisposition, especially in individuals with high polygenic risk scores [44].

6. Depression Treatment

In older adults (65+), combining antidepressant treatment (e.g., sertraline) with exercise increased remission likelihood, particularly in patients aged 75 and above [45]. Among adults aged 18–65, combining aerobic exercise with antidepressants or body awareness therapy over 10 weeks reduced depressive symptoms as measured by the MADRS scale [47], although no differences were observed in remission rates [46, 48]. Limitations include small sample sizes and short follow-up duration.

7. Anxiety Disorders

A meta-analysis involving over 69,000 participants found that physical activity lowers the incidence of anxiety-related disorders, including agoraphobia and post-traumatic stress disorder [49].

8. Additional Considerations

Regular physical activity fosters self-discipline and self-regulation, which are independently associated with lower psychopathology and better stress coping (50). It also facilitates social interaction through team sports and group activities, which contribute to improved mood and reduced anxiety and depression symptoms [51].

SLEEP

1. Sleep and Mental Health

Adequate sleep is a crucial determinant of psychological well-being and physiological recovery. Sleep hygiene encompasses a set of behavioral and environmental recommendations aimed at improving sleep quality and mitigating sleep-related disorders. It constitutes the core of cognitive behavioral therapy for insomnia (CBT-I), which has demonstrated efficacy among adolescents and young adults, especially in populations with limited awareness of healthy sleep habits [52].

2. Age-Related Changes in Sleep Patterns

Irregular sleep schedules are particularly prevalent among school-aged children and university students. Weekdays are often characterized by sleep restriction, followed by compensatory oversleeping on weekends, resulting in circadian rhythm disruption, impaired emotional stability, and reduced academic performance [52]. Comparative studies indicate that students in 2001 slept nearly one hour less than those in 1969. Moreover, the prevalence of reported sleep disturbances increased from 26.7% to 68.3% over the same period [52]. Age-related deterioration in sleep quality is influenced both by biological aging and comorbid health conditions.

3. Sleep Hygiene Recommendations

Long-term improvements in sleep quality are largely dependent on behavioral modifications. Evidence-based guidelines recommend 7 to 9 hours of sleep per night, consistent sleep-wake timing, and maintenance of a regular daily routine. Additional strategies include engaging in physical activity during the day, avoiding stimulants such as caffeine and alcohol in the evening, limiting late-night meals, and minimizing exposure to bright artificial light before bedtime [53].

4. Psychological and Physiological Role of Sleep

The circadian rhythm—regulated by environmental light-dark cycles—governs hormonal secretion, neural activity, body temperature, tissue regeneration, and autonomic functions. Sleep is structured into cycles composed of non-rapid eye movement (NREM) and rapid eye movement (REM) phases. The deeper stages of NREM sleep are associated with decreased delta wave activity and are critical for physical restoration. During this phase, growth hormone (GH) secretion is upregulated, facilitating tissue repair and neuroregeneration.

Sleep deprivation has been shown to impair wound healing, cell proliferation, and protein synthesis, with the highest restorative activity occurring during nocturnal sleep [54].

5. Consequences of Sleep Deprivation

Cumulative sleep deficit is associated with wide-ranging impairments in cognitive, emotional, and professional functioning. A study involving medical residents revealed that insufficient sleep negatively affected their interpersonal relationships, mental and physical health, as well as clinical performance. Sleep deprivation led to reduced learning capacity, diminished concentration, motivational decline, and increased emotional dysregulation. Furthermore, sleep-deprived clinicians demonstrated reduced empathy and attentiveness, elevating the risk of medical errors [55].

Table 4. Summary of Sleep Hygiene and Its Mental Health Implications

Category	Description
Definition	Sleep hygiene refers to behavioral and environmental practices aimed at improving sleep quality and preventing or treating sleep-related disorders.
Common Issues in Youth	Irregular sleep schedules, shorter sleep duration on weekdays, compensatory oversleeping on weekends, low awareness of sleep hygiene practices.
Consequences of Poor Sleep	Disruption of circadian rhythm, impaired academic performance, emotional instability, reduced cognitive function.
Historical Changes	In 2001, students slept ~1 hour less than in 1969; prevalence of sleep disturbances increased from 26.7% to 68.3% over four decades [52].
Age-Related Changes	Sleep quality decreases with age due to biological aging and the presence of chronic illnesses or pain conditions [52].
Physiological Role	Sleep supports tissue repair, immune function, hormone regulation (notably growth hormone), and neural recovery, especially during NREM deep sleep [54].
Recommended Practices	7–9 hours of sleep per night, fixed sleep/wake times, physical activity, reduced evening caffeine/alcohol intake, and limited light exposure at night [53].
Occupational Consequences	Sleep deprivation in professionals leads to reduced empathy, poor concentration, increased risk of error, and impaired learning and decision-making [55].

CONCLUSIONS AND RECOMMENDATIONS

Mental health is profoundly influenced by modifiable lifestyle factors, including nutrition, physical activity, and sleep hygiene. As this review demonstrates, evidence supports the implementation of integrated lifestyle-based interventions both in the prevention and adjunctive treatment of mental disorders.

Epidemiological data from Poland underscore the urgency of this approach. Over 50% of Polish adults are overweight or obese, a condition associated with elevated risk of depression and cognitive decline [57]. Moreover, the burden of psychiatric conditions in Poland continues to rise, particularly among younger populations [56]. These trends highlight the need for population-level strategies targeting behavioral risk factors.

KEY CONCLUSIONS

1. Nutrition: Diets rich in omega-3 fatty acids, fiber, micronutrients (e.g. B vitamins, zinc, magnesium), and antioxidant compounds support neuroplasticity and emotional regulation. Processed foods high in saturated fats and sugars contribute to systemic inflammation and increased risk of mood disorders.
2. Physical activity: Regular moderate-to-vigorous exercise reduces the risk of depression and anxiety,

improves cognitive function, and enhances treatment outcomes in patients with diagnosed psychiatric disorders. Mechanisms include reduced inflammation, increased brain-derived neurotrophic factor (BDNF), and improved stress resilience.

3. Sleep hygiene: Adequate and regular sleep is essential for neuroendocrine recovery, emotional stability, and cognitive performance. Poor sleep is both a risk factor and symptom of mental illness, particularly in youth and older adults.

RECOMMENDATIONS

- Clinical practice: Healthcare providers should routinely assess and promote lifestyle factors as part of comprehensive mental health care. Psychoeducation on diet, exercise, and sleep should be included in therapeutic programs.
- Public health: National guidelines on mental health should integrate dietary and physical activity recommendations. Campaigns promoting healthy behaviours in schools and workplaces may prevent early onset of psychiatric symptoms.
- Research: Further interdisciplinary studies are needed to define optimal lifestyle interventions tailored to age, sex, and genetic predispositions. Research in the Polish context should be expanded to develop evidence-based, culturally relevant models of mental health promotion.

In summary, diet, physical activity, and sleep are not merely adjuncts but essential pillars of mental health. Their integration into clinical, educational, and policy frameworks offers a cost-effective, evidence-based strategy to address the rising mental health burden in Poland and beyond.

REFERENCES

1. Ekinci GN, Sanlier N. The relationship between nutrition and depression in the life process: A mini-review. Exp Gerontol. 2023; 172(1): 1-5. https://doi.org/10.1016/j.exger.2022.112072.
2. McGrath J, Brown A, St Clair D. Prevention and schizophrenia-the role of dietary factors. Schizophr Bull. 2011; 37(2): 272-283. https://doi.org/10.1093/schbul/sbq121.
3. Chan NY, Chan JWY, Li SX, et al. Non-pharmacological Approaches for Management of Insomnia. Neurotherapeutics. 2021; 18(1): 32-43. https://doi.org/10.1007/s13311-021-01029-2.
4. Krajewska O, Skrypnik K, Kręgielska-Narożna M, i wsp. Wpływ długości i jakości snu na parametry antropometryczne, metaboliczne i ogólny stan zdrowia fizycznego i psychicznego. Forum Zaburzeń Metabolicznych. 2017; 8(2): 47–54.
5. Gangwisch JE. A review of evidence for the link between sleep duration and hypertension. Am J Hypertens. 2014; 27(10): 1235–1242. https://doi.org/10.1093/ajh/hpu071.
6. Nowak PF. Związki deklarowanej aktywności i sprawności fizycznej z samooceną dobrostanu psychicznego u maturzystów. Med Og Nauk Zdr. 2012; 18(4): 361–365.
7. Gieroba B. Wpływ aktywności fizycznej na zdrowie psychiczne i funkcje poznawcze. Med Og Nauk Zdr. 2019; 25(3): 153–161. https://doi.org/10.26444/monz/112259.
8. Fox KR. The influence of physical activity on mental well-being. Public Health Nutr. 1999; 2(3a): 411–418. https://doi.org/10.1017/s1368980099000567.
9. Rawa-Kochanowska A, Turska D. Jedzenie a potrzeby psychiczne jednostki. Wydawnictwo KUL, 2016.
10. Jarosz M. Normy żywienia dla populacji Polski. Wydawnictwo Instytut Żywności i Żywienia, 2017.
11. Jarosz M. Piramida Zdrowego Żywienia i Aktywności Fizycznej dla osób starszych. Wydawnictwo Instytut Żywności i Żywienia, 2018.
12. Osiński W. Nadwaga i otyłość. Aktywność fizyczna w profilaktyce i terapii. Wydawnictwo Lekarskie PZWL, 2016.
13. Gawęcki J. Żywienie człowieka 1 – Podstawy Nauki o Żywieniu. Wydawnictwo Naukowe PWN, 2017.
14. Opie RS, Itsiopoulos C, Parletta N, et al. Dietary recommendations for the prevention of depression. Nutr Neurosci. 2017; 20(3): 161–171. https://doi.org/10.1179/1476830515Y.0000000043.
15. Berk M, Williams LJ, Jacka FN, et al. So depression is an inflammatory disease, but where does the inflammation come from? BMC Med. 2013; 11: 200. https://doi.org/10.1186/1741-7015-11-200.
16. Diniz BS, Mendes-Silva AP, Silva LB, et al. Oxidative stress markers imbalance in late-life depression. J Psychiatr Res. 2018; 102: 29-33. https://doi.org/10.1016/j.jpsychires.2018.02.023.
17. Łopuszko A, Lebiecka Z, Rudkowski J, i wsp. Wysiłek fizyczny jako terapia wspomagająca w leczeniu schizofrenii. Psychiatria. 2019; 16(1): 33–43. https://doi.org/10.12740/PP/140053.
18. Herwig U, Dhum M, Hittmeyer A, et al. Neural signaling of food healthiness associated with emotion

processing. Front Aging Neurosci. 2016; 8:16. https://doi.org/10.3389/fnagi.2016.00016.

19. Jacka FN, O'Neil A, Opie R, et al. A randomised controlled trial of dietary improvement for adults with major depression (the ‚SMILES' trial). BMC Med. 2017; 15(1): 23. https://doi.org/10.1186/s12916-017-0791-y.
20. Chatterton ML, Mihalopoulos C, O'Neil A, et al. Economic evaluation of a dietary intervention for adults with major depression (the 'SMILES' trial). BMC Public Health. 2018; 18 (1): 2-8. https://doi.org/10.1186/s12889-018-5504-8.
21. Lee DK, Lipner SR. The Potential of N-Acetylcysteine for Treatment of Trichotillomania, Excoriation Disorder, Onychophagia, and Onychotillomania: An Updated Literature Review. Int J Environ Res Public Health. 2022; 19(11): 11-12. https://doi.org/10.3390/ijerph19116370.
22. Szewczyk B, Kotarska K, Siwek A, i wsp. Antidepressant activity of zinc: Further evidence for the involvement of the serotonergic system. Pharmacol Rep. 2017; 69(3): 456-461. https://doi.org/10.1016/j.pharep.2017.01.008.
23. Bender A, Hagan KE, Kingston N. The association of folate and depression: A meta-analysis. J Psychiatr Res. 2017; 95: 9-18. https://doi.org/10.1016/j.jpsychires.2017.07.019.
24. Omidian M, Mahmoudi M, Abshirini M, et al. Effects of vitamin D supplementation on depressive symptoms in type 2 diabetes mellitus patients: Randomized placebo-controlled double-blind clinical trial. Diabetes Metab Syndr. 2019; 13(4): 2375-2380. https://doi.org/10.1016/j.dsx.2019.06.011.
25. Maltais M, de Souto Barreto P, Pothier K, et al. Lifestyle multidomain intervention, omega-3 supplementation, or both for reducing the risk of developing clinically relevant depressive symptoms in older adults with memory complaints? Secondary analysis from the MAPT trial. Exp Gerontol. 2019; 120: 28-34. https://doi.org/10.1016/j.exger.2019.02.010.
26. Parletta N, Zarnowiecki D, Cho J, et al. A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED). Nutr Neurosci. 2019; 22(7): 474-487. https://doi.org/10.1080/1028415X.2017.1411320.
27. WHO 2024. Physical activity. https://www.who.int/news-room/fact-sheets/detail/physical-activity.
28. Patel H, Alkhawam H, Madanieh R, et al. Aerobic vs anaerobic exercise training effects on the cardiovascular system. World journal of cardiology. 2017; 9(2): 134–138. https://doi.org/10.4330/wjc.v9.i2.134.
29. Herrmann SD, Willis EA, Ainsworth BE, et al. Adult Compendium of Physical Activities: A third update of the energy costs of human activities. J Sport Health Sci. 2024; 13(1): 6-12. https://doi.org/10.1016/j.jshs.2023.10.010.
30. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020; 54(24): 1451-1462. https://doi.org/10.1136/bjsports-2020-102955.
31. Perry AS, Dooley EE, Master H, et al. Physical Activity Over the Lifecourse and Cardiovascular Disease. Circ Res. 2023; 132(12): 1725-1740. https://doi.org/10.1161/CIRCRESAHA.123.322121.
32. Kobayashi-Cuya KE, Sakurai R, Suzuki H, et al. Observational Evidence of the Association Between Handgrip Strength, Hand Dexterity, and Cognitive Performance in Community-Dwelling Older Adults: A Systematic Review. J Epidemiol. 2018; 28(9): 373-381. https://doi.org/10.2188/jea.JE20170041.
33. Ekelund U, Tarp J, Steene-Johannessen J, et al. Dose-response associations between accelerometry measured physical activity and sedentary time and all cause mortality: systematic review and harmonised meta-analysis. BMJ. 2019; 366(1): l4570. https://doi.org/10.1136/bmj.l4570.
34. Alghadir AH, Gabr SA, Al-Eisa ES. Effects of Moderate Aerobic Exercise on Cognitive Abilities and Redox State Biomarkers in Older Adults. Oxid Med Cell Longev. 2016; 2016(5): 1-8. https://doi.org/10.1155/2016/2545168.
35. Augusto-Oliveira M, Arrifano GP, Leal-Nazaré CG, et al. Exercise Reshapes the Brain: Molecular, Cellular, and Structural Changes Associated with Cognitive Improvements. Mol Neurobiol. 2023; 60(12): 6950-6974. https://doi.org/10.1007/s12035-023-03492-8.
36. Suwabe K, Byun K, Hyodo K, et al. Rapid stimulation of human dentate gyrus function with acute mild exercise. Proc. Natl. Acad. Sci. U.S.A. 2018; 115(41): 10487-10492. https://doi.org/10.1073/pnas.1805668115.
37. Pereira AC, Huddleston DE, Brickman AM, et al. An in vivo correlate of exercise-induced neurogenesis in the adult dentate gyrus. Proc. Natl. Acad. Sci. U.S.A. 2007; 104(13): 5638–5643. https://doi.org/10.1073/pnas.0611721104.
38. Nakagawa T, Koan I, Chen C, et al. Regular Moderate- to Vigorous-Intensity Physical Activity Rather Than Walking Is Associated with Enhanced Cognitive Functions and Mental Health in Young Adults. Int. J. Environ. Res. Public Health. 2020; 17(2): 614. https://doi.org/10.3390/ijerph17020614.
39. Schuch FB, Vancampfort D, Firth J, et al. Physical Activity and Incident Depression: A Meta-Analysis of

Prospective Cohort Studies. Am J Psychiatry. 2018; 175(7): 631-648. https://doi.org/10.1176/appi.ajp.2018.17111194.

40. Choi KW, Chen C, Stein MB, et al. Assessment of Bidirectional Relationships Between Physical Activity and Depression Among Adults: A 2-Sample Mendelian Randomization Study. JAMA Psychiatry. 2019; 76(4): 399–408. https://doi.org/10.1001/jamapsychiatry.2018.4175.
41. Choi KW, Zheutlin AB, Karlson RA, et al. Physical activity offsets genetic risk for incident depression assessed via electronic health records in a biobank cohort study. Depress Anxiety. 2020; 37(2): 106-114. https://doi.org/10.1002/da.22967.
42. Zanetidou S, Belvederi Murri M, Menchetti M, et al. Safety Efficacy of Exercise for Depression in Seniors Study Group. Physical Exercise for Late-Life Depression: Customizing an Intervention for Primary Care. J Am Geriatr Soc. 2017; 65(2): 348-355. https://doi.org/10.1111/jgs.14525.
43. Vancampfort D, Brunner E, Van Damme T, et al. Efficacy of basic body awareness therapy on functional outcomes: A systematic review and meta-analysis of randomized controlled trials. Physiotherapy research international. 2023; 28(1): 1-3. https://doi.org/10.1002/pri.1975.
44. Quilty LC, Robinson JJ, Rolland JP, et al. The structure of the Montgomery–Åsberg depression rating scale over the course of treatment for depression. Int. J. Methods Psychiatr. Res. 2013; 22(3): 175-184. https://doi.org/10.1002/mpr.1388.
45. Danielsson L, Papoulias I, Petersson EL, et al. Exercise or basic body awareness therapy as add-on treatment for major depression: A controlled study. Journal of Affective Disorders. 2014; 168(1): 98-106. https://doi.org/10.1016/j.jad.2014.06.049.
46. Schuch FB, Stubbs B, Meyer J, et al. Physical activity protects from incident anxiety: A meta-analysis of prospective cohort studies. Depression and anxiety. 2019; 36(9): 846–858. https://doi.org/10.1002/da.22915.
47. Elkhenany H, AlOkda A, El-Badawy A, et al. Tissue regeneration: Impact of sleep on stem cell regenerative capacity. Life Sciences. 2018; 214(1): 51-61. https://doi.org/10.1016/j.lfs.2018.10.057.
48. Hirshkowitz M, Whiton K, Albert SM, et al. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. 2015; 1(1): 40-43. https://doi.org/10.1016/j.sleh.2014.12.010.
49. Min AA, Sbarra DA, Keim SM. Sleep disturbances predict prospective declines in resident physicians' psychological well-being. Med Educ Online. 2015; 20(1): 1-3. https://doi.org/10.3402/meo.v20.28530.
50. Baranwal N, Yu PK, Siegel NS. Sleep physiology, pathophysiology, and sleep hygiene. Progress in Cardiovascular Diseases. 2023; 77(1): 59-69. https://doi.org/10.1016/j.pcad.2023.02.005.
51. Cruwys, T., Dingle, G. A., Haslam, C., Haslam, S. A., Jetten, J., & Morton, T. A. (2013). Social group memberships protect against future depression, alleviate depression symptoms and prevent depression relapse. *Social Science & Medicine, 98*, 179–186. https://doi.org/10.1016/j.socscimed.2013.09.013
52. Elkhenany, H., AlOkda, A., El-Badawy, A., El-Mokhtar, M. A., Elazab, A. R. M., & Abdelgawad, M. (2018). Tissue regeneration: Impact of sleep on stem cell regenerative capacity. *Life Sciences, 214*, 51–61. https://doi.org/10.1016/j.lfs.2018.10.057
53. Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E. S., Kheirandish-Gozal, L., Neubauer, D. N., O'Donnell, A. E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R. C., Setters, B., Vitiello, M. V., Ware, J. C., & Adams Hillard, P. J. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health, 1*(1), 40–43. https://doi.org/10.1016/j.sleh.2014.12.010
54. Min, A. A., Sbarra, D. A., & Keim, S. M. (2015). Sleep disturbances predict prospective declines in resident physicians' psychological well-being. *Medical Education Online*, *20*(1). https://doi.org/10.3402/meo.v20.28530.
55. Baranwal, N., Yu, P. K., & Siegel, N. S. (2023). Sleep physiology, pathophysiology, and sleep hygiene. Progress in Cardiovascular Diseases, 77(1), 59–69. https://doi.org/10.1016/j.pcad.2023.02.005
56. Didkowska, J., Wojciechowska, U., Olasek, P., Michałek, I., & Ciuba, A. (2023). Cancer in Poland in 2021. Nowotwory. Journal of Oncology, 73(4), 281–303. https://doi.org/10.5603/NJO.2023.0040 https://journals.viamedica.pl/nowotwory_journal_of_oncology/article/view/99065
57. Raciborski, F., Pinkas, J., Jankowski, M., Zgliczyński, W. S., Wierzba, W., & Jóźwiak, J. (2023). Prevalence of overweight and obesity among adults in Poland: Results of the WOBASZ II study. Nutrients, 16(23), 4248. https://doi.org/10.3390/nu16234248 https://www.mdpi.com/2072-6643/16/23/4248

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