

## Assessing The Physical, Psychosocial, And Cognitive Impacts Of Ramadan Fasting In Young Adults

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### Abstract

#### Background:

Ramadan fasting involves abstaining from food and drink from dawn to dusk for about a month. Its effects on young adults, who actively engage in academic, social, and physical activities, are of particular interest.

#### Objective:

This study aims to assess the physical, psychosocial, and cognitive impacts of Ramadan fasting in young adults.

#### Methods:

A case-control study was conducted among 50 healthy young adults (aged 18–25), divided equally into fasting and non-fasting groups. Anthropometric (BMI, Chalder Fatigue Scale), psychosocial (Depression Anxiety Stress Scales-21), and cognitive (Montreal Cognitive Assessment) parameters were measured before and after Ramadan.

#### Results:

Fasting resulted in a significant reduction in BMI ( $p = 0.0223$ ) in the fasting group, indicating beneficial weight loss. Cognitive scores showed numerical improvements without reaching statistical significance. Stress levels increased significantly ( $p = 0.0391$ ) among fasting participants, while depression and anxiety scores remained unchanged. Fatigue levels showed no significant differences.

#### Conclusion:

Ramadan fasting positively influenced body weight and appeared to maintain cognitive performance in young adults, though it was associated with an increase in perceived stress. These findings suggest that intermittent fasting during Ramadan may benefit physical and cognitive health, with some psychosocial considerations.

**Keywords:** Ramadan fasting, Intermittent fasting, cognitive function, BMI, Stress.

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### I. Introduction

Fasting, voluntary avoidance of food and drink for a stipulated time, has been followed for religious, cultural, and health purposes. Fasting during Ramadan, a time that is observed every year by Muslims all over the world, involves refraining from food and fluid intake from dawn till dusk for about a month. It is important to know the effects of Ramadan fasting, especially in young adults, since they represent a population that participates actively in academic, social, and physical functions. Ramadan fasting in young adults shows both positive and negative impacts (1).

Fasting during Ramadan usually results in short-term decreases in body weight and percentage of body fat. Research indicates that this is the result of decreased calorie consumption and changed eating habits. Yet these modifications are mostly reversed during post-Ramadan. Noticeable decreases in total cholesterol, LDL cholesterol, and triglyceride levels are mostly seen, which can lower the risk of cardiovascular diseases (2). Increased insulin sensitivity and decreased fasting blood glucose are observed, suggesting a positive effect in individuals with prediabetes (3). Hormone levels such as cortisol may be affected by Ramadan fasting, possibly increasing because of disrupted sleep and eating cycles. Secretion of growth hormone may also increase, helping repair muscle and metabolize fat (4). Dehydration may result from prolonged fasting without water, particularly in warm weather. Dehydration can also lead to fatigue, headaches, and cognitive function impairment (5). Fasting in Ramadan can enhance gut health through improved digestion and increased gut microbiome diversity from controlled eating habits (6).

Ramadan enhances a high level of social connectedness, which has beneficial psychosocial effects. Communal prayer, meals, and family reunions, as identified by Aloui et al. (7), increase social bonding and minimize loneliness in young adults. The disciplined daily routine of fasting also inculcates discipline and time management, which promote individual development and social responsibility. Conversely, certain studies have

indicated that fasting leads to temporary withdrawal from social interactions because of fatigue or changed energy levels. Hussin et al. (8) discovered that fasting strengthens mood stability and diminishes depression and anxiety symptoms among young adults. Roky et al. (9), in a study, noted that certain young adults decrease participation in extracurricular activities and physical activity during Ramadan, which can influence their overall social activity. Harvie et al. (10) identify through a systematic review that fasting aids in emotional control and stress reduction among young adults. Conversely, research by Almeneessier et al. (11) indicates that fasting, particularly during religious periods such as Ramadan, can lead to mood swings and sleep disorders in some people. Stunkard et al. (12) established that fasting can affect social behaviors, with some people showing increased irritability or social withdrawal. Research by Azizi (13) indicates that young adults who fast have lower cortisol levels, which reflects decreased physiological stress. In addition, the religious aspect of Ramadan, such as prayer and meditation, is associated with improved coping mechanisms and emotional control (14). Nevertheless, there is variation in individual experiences, and some young adults can experience difficulties with changes in routine, sleep loss, and food adjustments. Waterhouse et al. (15) found in a study that individuals with prior anxiety or stress-related disorders can have increased stress responses during Ramadan.

Studies on the effects of Ramadan fasting on memory and attention have provided inconsistent results. Salti et al. (16) found that young adults had minor decreases in sustained attention and working memory performance during fasting. Yet, a contrasting study by Ouanes et al. (17) observed no significant decrease in short-term memory tasks in fasting subjects, indicating that cognitive resilience could be involved in the preservation of attention during fasting. For young professionals and students, these changes in cognition could affect academic performance and productivity. A study by Roky et al. (2004) reported that fasting did not have a significant detrimental effect on logical reasoning or abstract thinking, but subjects evidenced slower response times in complicated decision-making tasks. Likewise, Bouguerra et al. (18) noted that young adults experienced transient cognitive flexibility decline, which was reversed after the fasting period. Some research reports slight impairments of cognitive functioning with fasting, though these impairments are mostly reversible and resolve once the participant leaves Ramadan.

## II. Materials And Methods

### *Aim*

This study aims to investigate the physiological, psychosocial and cognitive effects of Ramadan fasting on young adults

### *Methodology*

This case-control study was conducted in the month of Ramadan (March 2025) on 50 young adults who were grouped into fasting (test) and non-fasting (control) with 25 subjects in each group. This study was conducted in the Department of Physiology of PMS College of Dental Science and Research, Trivandrum, Kerala. Ethical approval was taken from the institutional ethics committee before starting the study (IEC NO: PMS/IEC/2025Add/Feb/01), and written informed consent was obtained from all the participants. Participants are allowed to withdraw at any time. Confidentiality and anonymity will be ensured across the study. Healthy, willing participants in the age group of 18-25 who had been fasting for more than 15 days were included. Subjects under medication, recent surgery, and subjects who have a habit of alcohol, smoking, and drug consumption were excluded. The non-fasting group followed the routine diet and activities, whereas the fasting group followed the fasting routine with regular activities.

The anthropometric parameters (body weight, BMI, and energy levels by using CFS), psychosocial parameters (DASS21), and cognitive assessment (MOCA test) were analyzed two days before starting the Ramadan fasting in both the test and control groups. These experiments were repeated again on the last day of Ramadan.

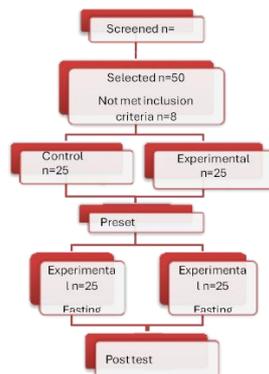


FIGURE 1: Subject allotment flowchart

**BMI and CFS**

The parameters, such as height and weight, were assessed by using the standard measures and BMI was assessed by using the formula  $BMI = \text{weight (kg)} / \text{height (m)}^2$ . Chalder fatigue scale (CFS) was used to assess the energy levels of the participants. The self-reported questionnaire was made available to the participants and they entered the details twice during the study period.

**DASS 21**

Depression, anxiety, and stress were assessed by using the DASS 21 questionnaire. The 21 questions were formed with Google Forms, and the participants were asked to fill out the forms.

The subjects entered the values before starting the study and on the last day also. Depression, anxiety, and stress scores were calculated and analyzed.

**MOCA**

The Montreal Cognitive Assessment (MOCA) is a screening tool to detect mild cognitive impairment. The test was administered to the subjects before the fasting and at the end of fasting in both groups. This test is scored out of a total of 30 points, where a score of less than 25 is considered to be cognitive impairment. Investigators explained the test to the subjects, and sheets were given to the subjects to enter the details.

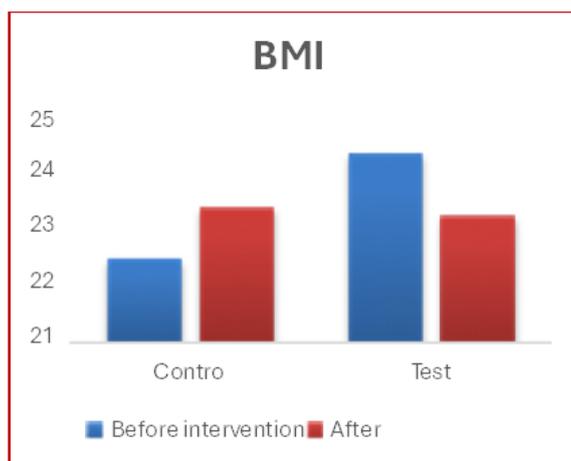
**III. Results**

Demographic and anthropometric comparison of the subject (Table 1) shows that the number of female participants was more compared to the number of males. Height, weight and BMI of the subjects were kept matching in both the groups.

**TABLE 1: Demographic and anthropometric comparison between control and test groups**

		Control	Test	$\chi^2$	t test	df	p
		n	n				
Gender	Male	6	6	0	-	1	1.0
	Female	19	19	0	-	1	1.0
Height		1.65 m	1.65 m	-	0	48	1.0
Weight		64.83kg	61.66 kg	-	2.24	48	0.03
BMI		23.82	22.65	-	2.07	48	0.043

**FIGURE 2: BMI changes in control and test groups**



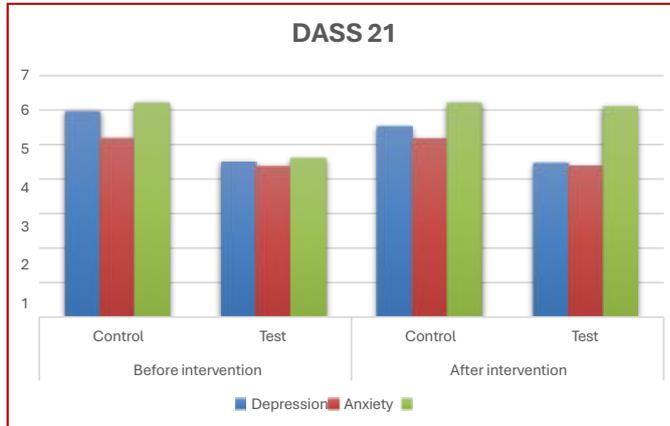
**TABLE 2: Pre- and Post-intervention comparison of BMI, MOCA, and CFS by t-test.**

	Control (n=25)				Test (n=25)			
	Baseline	30 <sup>th</sup> day	t	p	Baseline	30 <sup>th</sup> day	t	p
BMI	21.3±2.5	22.65±2.5	1.9092	0.0622	24.1±2.5	22.43±2.5	2.3617	0.0223*
MOCA	28.56±2.5	29.0±2.5	0.6223	0.5367	27.52±2.5	28.5±2.5	1.3859	0.1722
CFS	1.0±2.5	1.0±2.5	0.0000	1.0000	0.0±2.5	1.0±2.5	1.4142	0.1638

\*p≤0.05 is significant

Table 2 shows the comparative assessment of BMI, MOCA and CFS between the control and test group. The only statistically significant finding was a decrease in BMI in the test group over 30 days ( $p = 0.0223$ ), (Figure; 2), which may indicate that intermittent fasting, like Ramadan fasting, has a significant effect on body weight. All other changes in cognitive assessment (MOCA) and fatigue (CFS) were not important in either group, suggesting that Ramadan fasting does not produce any fatigue or cognitive reduction during the study period.

**FIGURE 3: DASS-21 Subscale scores in control and test**



**TABLE 3: Comparison of DAS scores by t test**

Parameter	Control (n=25)				Test (n=25)			
	Baseline	30 <sup>th</sup> day	t	p	Baseline	30 <sup>th</sup> day	t	p
Depression	5.96±2.5	5.52±2.5	0.6223	0.5367	4.48±2.5	4.45±2.5	0.0424	0.9663
Anxiety	5.16±2.5	5.16±2.5	0.0000	1.0000	4.36±2.5	4.38±2.5	0.0283	0.9776
Stress	6.2±2.5	6.2±2.5	0.0000	1.0000	4.6±2.5	6.1±2.5	2.1213	0.0391*

\* $p \leq 0.05$  is significant

Table 3, shows the changes in DAS score in the control and test groups. The changes in depression and anxiety scores in both groups were not statistically significant, which shows that fasting doesn't affect the mental state of the subjects. The increase in stress in the test group is statistically significant ( $p < 0.05$ ). This suggests that not taking food at usual timings increased their stress levels.

#### IV. Discussion

##### Physical Outcomes (CFS and BMI)

The current study showed a statistically significant decrease in Body Mass Index (BMI) in the test group during the 30-day intervention program (from 24.1 to 22.43,  $p = 0.0223$ ), while no improvement was found in the control group ( $p = 0.0622$ ). The result indicates the efficacy of the intervention in decreasing body weight. Frequent changes in BMI over brief periods are most commonly linked to dietary change, physical activity, or metabolic change precipitated by formal health interventions (19, 20). These findings are consistent with meta-analyses demonstrating that lifestyle interventions can produce statistically and clinically significant weight loss even after one month if participant adherence is sufficient (21).

Fatigue levels, as measured by the Chalder Fatigue Scale (CFS), also failed to change in either group. Both the control and test groups were not significant ( $p = 1.0$  and  $p = 0.1638$ , respectively), reflecting no significant change in subjective fatigue. This may be due to the brief nature of the study or the requirement for a more focused intervention addressing energy balance, sleep hygiene, or stress regulation, which are established causes of chronic fatigue (22). Earlier research has highlighted that whereas weight loss is usually an early response, the resolution of fatigue can be slower or need longer interventions specifically focused on energy repletion (23).

##### Psychosocial Outcomes (DASS-21)

Psychosocial factors were assessed using the Depression, Anxiety, and Stress Scales (DASS- 21). There were no significant changes in depression and anxiety scores within either group ( $p > 0.9$ ), suggesting these domains of emotional well-being remained constant during the intervention. These findings are in line with earlier research that general health interventions, unless specifically involving mental health components, can have

limited effects on mood disorders like depression and anxiety (24). Additionally, emotional changes tend to need longer follow-up times and behavioral therapy or counseling in addition to physical health interventions (25).

Notably, the test group experienced a statistically significant rise in stress scores (from 4.6 to 6.1,  $p = 0.0391$ ), whereas the control group did not change. This indicates that the intervention, as positive as it was for BMI, perhaps induced psychological stress, perhaps due to the effort necessary for compliance, felt pressure to succeed, or interference with customary habits (26). Comparable results have been found where changes in health behaviour, particularly when sudden or extreme, lead to increased perceived stress in spite of physical gains (27). This indicates the need for incorporating stress management techniques, like mindfulness or cognitive-behavioural components, into intervention protocols to counteract unwanted psychosocial consequences (28).

### **Cognitive Outcomes (MOCA)**

Cognitive performance, measured by the Montreal Cognitive Assessment (MOCA), had no statistically significant differences in either group following the intervention. The control group's scores rose slightly (28.56 to 29.0), as did the test group's (27.52 to 28.5), but these were not significant ( $p > 0.17$ ). This indicates that although there might have been slight improvements, they were not significant enough to validate cognitive enhancement as a direct effect of the intervention.

Cognitive changes have been previously found to necessitate greater intervention durations, especially where cognitive baseline scores are already high, such as in this study (average MOCA scores  $>27$ ). Exercise with aerobics and cognitive training has produced cognitive advantages in a few studies, but typically over the course of several months and frequently more noticeable in mildly cognitively impaired groups or at-risk elderly (29, 30). Therefore, the short time frame and non-cognitive emphasis of the intervention can account for the restricted cognitive outcomes in the present research.

### **V. Conclusion**

The BMI of the test group shows a significant reduction proving that intermittent fasting is beneficial in reducing body weight. There was no significant difference was observed in energy levels and cognitive functions in both the groups, In fact there was a numerical improvement in scores were observed in the cognitive functions in the test group suggesting that intermittent fast like Ramadan fasting was effective in improving the cognitive functions. The stress scores show a significant difference in fasting group suggesting that abstinence from food may produce a stressful response on the individual. from our study it is evident that Ramadan fasting has a positive effect on the Physiological and cognitive status of healthy people. This type of religious practices can improve health and mental well-being of an individual.

### **Conflicts Of Interest**

The authors declare no conflict of interest.

### **Source Of Funding**

This research received no external funding.

### **Ethical Considerations**

The study was approved by the institutional ethics committee IEC NO: PMS/IEC/2025Add/Feb/01. All the participants signed the written informed consent before starting the study

### **References**

- [1]. Norouzy, A.; Salehi, M.; Philippou, E.; Arabi, H.; Shiva, F.; Mehrnoosh, S.; Mohajeri, S. M. R.; Mohajeri, S. A. R.; Motaghedi Larijani, A.; Nematy, M. Effect Of Fasting In Ramadan On Body Composition And Nutritional Intake: A Prospective Study. *Journal Of Human Nutrition And Dietetics* 2013, 26, 97–104. <https://doi.org/10.1111/jhn.12042>.
- [2]. Farooq, A.; Herrera, C. P.; Almudahka, F.; Mansour, R. A Prospective Study Of The Physiological And Neurobehavioral Effects Of Ramadan Fasting In Preteen And Teenage Boys. *Journal Of The Academy Of Nutrition And Dietetics* 2015, 115 (6), 889–897. <https://doi.org/10.1016/j.jand.2015.02.012>.
- [3]. Shariatpanahi ZV, Shariatpanahi MV, Shahbazi S, Hossaini A, Abadi A. Effect Of Ramadan Fasting On Some Indices Of Insulin Resistance And Components Of The Metabolic Syndrome In Healthy Male Adults. *British Journal Of Nutrition*. 2008, 100(1):147-51.
- [4]. Almeneessier, A. S.; Pandi-Perumal, S. R.; Bahammam, A. S. Intermittent Fasting, Insufficient Sleep, And Circadian Rhythm: Interaction And Effects On The Cardiometabolic System. *Current Sleep Medicine Reports* 2018, 4 (3), 179–195. <https://doi.org/10.1007/S40675-018-0124-5>.
- [5]. Leiper, J. B.; Molla, A. M.; Molla, A. M. Effects On Health Of Fluid Restriction During Fasting In Ramadan. *European Journal Of Clinical Nutrition* 2003, 57 (2), S30–S38. <https://doi.org/10.1038/Sj.Ejcn.1601899>.
- [6]. Tian, H.-H.; Aziz, A.-R.; Png, W.; Wahid, M. F.; Yeo, D.; Constance Png, A.-L. Effects Of Fasting During Ramadan Month On Cognitive Function In Muslim Athletes. *Asian Journal Of Sports Medicine* 2011, 2 (3). <https://doi.org/10.5812/Asjms.34753>.
- [7]. Abaïdia, A.-E.; Daab, W.; Bouzid, M. A. Effects Of Ramadan Fasting On Physical Performance: A Systematic Review With Meta-Analysis. *Sports Medicine* 2020, 50. <https://doi.org/10.1007/S40279-020-01257-0>.
- [8]. Gudden, J.; Arias Vasquez, A.; Bloemendaal, M. The Effects Of Intermittent Fasting On Brain And Cognitive Function. *Nutrients* 2021, 13 (9), 3166. <https://doi.org/10.3390/Nu13093166>.

- [9]. Roky, R.; Houti, I.; Moussamih, S.; Qotbi, S.; Aadil, N. Physiological And Chronobiological Changes During Ramadan Intermittent Fasting. *Annals Of Nutrition And Metabolism* 2004, 48 (4), 296–303. <https://doi.org/10.1159/000081076>.
- [10]. Correia, J. M.; Santos, I.; Pezarat-Correia, P.; Silva, A. M.; Mendonca, G. V. Effects Of Ramadan And Non-Ramadan Intermittent Fasting On Body Composition: A Systematic Review And Meta-Analysis. *Frontiers In Nutrition* 2021, 7. <https://doi.org/10.3389/fnut.2020.625240>.
- [11]. Marwa Ben Mbarek; Badii Amamou; Amjed Ben Haouala; Mhalla, A.; Gassab, L.; Ferid Zaafrane. The Impact Of Ramadan Fasting On Sleep And Treatment Compliance In Psychiatric Patients: A Survey Study. *Journal Of Internal Medicine Science & Art* 2024, 5, 1–9. <https://doi.org/10.36013/jimsa.v5i.133>.
- [12]. Strüven, A.; Schlichtiger, J.; Hoppe, J. M.; Thiessen, I.; Kellnar, A.; Stremmel, C. Impact Of Intermittent Fasting On Sleep Physiology: A Prospective Observational Study Using Smartwatch Technology. *Pubmed* 2025, 104 (32), E43800–E43800. <https://doi.org/10.1097/Md.00000000000043800>.
- [13]. Wang, Y.; Wu, R. The Effect Of Fasting On Human Metabolism And Psychological Health. *Disease Markers* 2022, 2022 (1), 1–7. <https://doi.org/10.1155/2022/5653739>.
- [14]. Stec, K.; Pilis, K.; Wieslaw Pilis; Paweł Dolibog; Letkiewicz, S.; Alicja Głębocka. Effects Of Fasting On The Physiological And Psychological Responses In Middle-Aged Men. *Nutrients* 2023, 15 (15), 3444–3444. <https://doi.org/10.3390/Nu15153444>.
- [15]. Azizi, F. Islamic Fasting And Health. *Annals Of Nutrition And Metabolism* 2010, 56 (4), 273–282. <https://doi.org/10.1159/000295848>.
- [16]. Elshahry, N. A.; Ibrahim, M. O.; Alhaj, O. A.; Abu Doleh, G.; Aljahdali, A. A. Impact Of Ramadan Fasting On Mental Health, Body Composition, Physical Activity, And Sleep Outcomes Among University Students. *Healthcare* 2025, 13 (6), 639. <https://doi.org/10.3390/Healthcare13060639>.
- [17]. Waterhouse, J.; Alabed, H.; Edwards, B.; Reilly, T. Changes In Sleep, Mood And Subjective And Objective Responses To Physical Performance During The Daytime In Ramadan. *Biological Rhythm Research* 2009, 40 (5), 367–383. <https://doi.org/10.1080/09291010902863438>.
- [18]. Chamari, K.; Briki, W.; Farooq, A.; Patrick, T.; Belfekih, T.; Herrera, C. P. Impact Of Ramadan Intermittent Fasting On Cognitive Function In Trained Cyclists: A Pilot Study. *Biology Of Sport* 2016, 33 (1), 49–56. <https://doi.org/10.5604/20831862.1185888>.
- [19]. Ridwan Aji Budi Prasetyo; Ratri Nurwanti; Muhammad Afif Alhad. Effect Of Ramadan Intermittent Fasting On Cognitive Work Performance. *Deleted Journal* 2024, 26 (1), 25–36. <https://doi.org/10.9744/Jti.26.1.25-36>.
- [20]. Mcstay, M.; Gabel, K.; Cienfuegos, S.; Ezpeleta, M.; Lin, S.; Varady, K. A. Intermittent Fasting And Sleep: A Review Of Human Trials. *Nutrients* 2021, 13 (10), 3489. <https://doi.org/10.3390/Nu13103489>.
- [21]. Piech, R. M.; Hampshire, A.; Owen, A. M.; Parkinson, J. A. Modulation Of Cognitive Flexibility By Hunger And Desire. *Cognition & Emotion* 2009, 23 (3), 528–540. <https://doi.org/10.1080/02699930802012153>.
- [22]. Anderson, J. W.; Konz, E. C.; Frederich, R. C.; Wood, C. L. Long-Term Weight-Loss Maintenance: A Meta-Analysis Of US Studies. *The American Journal Of Clinical Nutrition* 2001, 74 (5), 579–584. <https://doi.org/10.1093/Ajcn/74.5.579>.
- [23]. Franz, M. J.; Vanwormer, J. J.; Crain, A. L.; Boucher, J. L.; Histon, T.; Caplan, W.; Bowman, J. D.; Pronk, N. P. Weight-Loss Outcomes: A Systematic Review And Meta-Analysis Of Weight-Loss Clinical Trials With A Minimum 1-Year Follow-Up. *Journal Of The American Dietetic Association* 2007, 107 (10), 1755–1767. <https://doi.org/10.1016/J.Jada.2007.07.017>.
- [24]. Johns, D. J.; Hartmann-Boyce, J.; Jebb, S. A.; Aveyard, P. Diet Or Exercise Interventions Vs Combined Behavioral Weight Management Programs: A Systematic Review And Meta-Analysis Of Direct Comparisons. *Journal Of The Academy Of Nutrition And Dietetics* 2014, 114 (10), 1557–1568. <https://doi.org/10.1016/J.Jand.2014.07.005>.
- [25]. Chalder, T.; Berelowitz, G.; Pawlikowska, T.; Watts, L.; Wessely, S.; Wright, D.; Wallace, E. P. Development Of A Fatigue Scale. *Journal Of Psychosomatic Research* 1993, 37 (2), 147–153. [https://doi.org/10.1016/0022-3999\(93\)90081-P](https://doi.org/10.1016/0022-3999(93)90081-P).
- [26]. Adamson, J.; Ali, S.; Santhouse, A.; Wessely, S.; Chalder, T. Cognitive Behavioural Therapy For Chronic Fatigue And Chronic Fatigue Syndrome: Outcomes From A Specialist Clinic In The UK. *Journal Of The Royal Society Of Medicine* 2020, 113 (10), 394–402. <https://doi.org/10.1177/0141076820951545>.
- [27]. Lovibond, P. F.; Lovibond, S. H. The Structure Of Negative Emotional States: Comparison Of The Depression Anxiety Stress Scales (DASS) With The Beck Depression And Anxiety Inventories. *Behaviour Research And Therapy* 1995, 33 (3), 335–343. [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U).
- [28]. Hofmann, S. G.; Asnaani, A.; Vonk, I. J. J.; Sawyer, A. T.; Fang, A. The Efficacy Of Cognitive Behavioral Therapy: A Review Of Meta-Analyses. *Cognitive Therapy And Research* 2012, 36 (5), 427–440. <https://doi.org/10.1007/S10608-012-9476-1>.
- [29]. Michie, S.; Abraham, C.; Whittington, C.; McAteer, J., & Gupta, S. (2009). Effective Techniques In Healthy Eating And Physical Activity Interventions: A Meta-Regression. *Health Psychology : Official Journal Of The Division Of Health Psychology, American Psychological Association*, 28(6), 690–701. <https://doi.org/10.1037/A0016136>
- [30]. Biddle, S.; Mutrie, N. *Psychology Of Physical Activity*; Routledge, 2007. <https://doi.org/10.4324/9780203019320>.
- [31]. Chiesa, A.; Serretti, A. Mindfulness-Based Stress Reduction For Stress Management In Healthy People: A Review And Meta-Analysis. *The Journal Of Alternative And Complementary Medicine* 2009, 15 (5), 593–600. <https://doi.org/10.1089/Acm.2008.0495>.
- [32]. Nasreddine, Z. S.; Phillips, N. A.; Bedirian, V.; Charbonneau, S.; Whitehead, V.; Collin, I.; Cummings, J. L.; Chertkow, H. The Montreal Cognitive Assessment, Moca: A Brief Screening Tool For Mild Cognitive Impairment. *Journal Of The American Geriatrics Society* 2005, 53 (4), 695–699. <https://doi.org/10.1111/J.1532-5415.2005.53221.X>.
- [33]. Young, J.; Angevaren, M.; Rusted, J.; Tabet, N. Aerobic Exercise To Improve Cognitive Function In Older People Without Known Cognitive Impairment. *Cochrane Database Of Systematic Reviews* 2015, No. 4. <https://doi.org/10.1002/14651858.Cd005381.Pub4>.