Title: Impact of Intermittent Fasting on the Mental Health of Lebanese Perimenopausal Women

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Abstract

Fasting is not merely about skipping meals or enduring long hours without food; instead, many who practice fasting see it as a strategic approach that enhances both health and well-being. Among the various forms of fasting, Intermittent Fasting (IF) is especially popular with the 16/8 method which involves eating within an 8-hour timeframe and fasting for the other 16 hours, each day. For women approaching perimenopause, this method may provide distinct benefits. This stage is significant due to its substantial impact on women's mental health and overall well-being, characterized by varying hormone levels that can result in physical and emotional symptoms. Although numerous studies have examined fasting, few specifically address the effects of intermittent fasting on women undergoing perimenopause. Consequently,

our study aims to investigate the impact of intermittent fasting on the mental health of women experiencing this stage. This study will employ a randomized control trial (RCT) design involving n=98 Lebanese women between the ages of 45 and 55. Participants will be assigned to either a control or experimental group. We will use independent t-tests to analyze the data. Ultimately, the aim of this study is to contribute to the expanding body of research on intermittent fasting and its potential benefits for women in the perimenopausal phase.

Keywords: Intermittent fasting, mental health, perimenopause, depression, anxiety, sleep, cognition, metabolic health.

Introduction

Fasting, particularly in the form of intermittent fasting (IF), has gained increasing attention for its potential benefits on both physical and mental health (Murta et al., 2023). This dietary strategy involves cycling between eating and fasting periods, which may enhance brain function and improve mood (Smart, 2024). The 16/8 method, a popular variation of intermittent fasting, allows for an 8-hour eating window followed by a 16-hour fast. Many individuals find this approach easy to integrate into their daily routines, as it often aligns with natural eating habits (Streit & Ajmera, 2024). Research has associated this strategy with improved metabolic health and weight loss (Streit & Ajmera, 2024). Fasting has been shown to support neurogenesis, lower stress, and balance hormones; processes associated with better emotional control and cognitive function (Watkins & Serpell, 2016). Notably, research indicates that IF may reduce anxiety and depressive symptoms, demonstrating the beneficial connection between fasting and mental health (Wiss, 2022).

The effects of IF on mental health are complex and warrant further investigation. Preliminary evidence suggests that fasting can reduce anxiety and depressive symptoms without increasing fatigue (Wiss, 2022). Some studies indicate that IF may improve mood and cognitive function by enhancing brain signaling and reducing inflammation markers related to cognitive decline (Murta el al., 2023; Moss, 2023). However, individual responses to fasting can vary particularly for those with pre-existing mental health conditions. While some may experience elevated levels of low mood after fasting (Ding et al., 2018), others report improvements in

mood and reduction of depressive symptoms (Wang & Wi, 2022; Stec et al., 2023; Igwe et al., 2023).

According to Murta et al. (2023), perimenopausal women are a group at risk for obesity and mental health issues because of hormonal changes that occur during this time. Perimenopause, menopause, and postmenopause are all parts of the menopausal transition, which typically happens between the ages of 45 and 55. Estrogen fluctuations during this time can have an impact on mood, metabolism, and general health. The Stages of Reproductive Aging Workshop (STRAW) defines perimenopause as a transitional phase that occurs late in women's reproductive life, just before the final menopausal period (Prior et al., 2021).

The perimenopausal stage is associated with an emergence of new physical and mental symptoms. For example, cognitive changes include a decrease in executive function, learning memory, attention, working memory, and processing speed (McCabe et al., 2010). A cross-sectional study carried out in Lebanon found that 62.5% of women between the ages of 45 and 67 had a considerably lower quality of life as a result of hot flushes (Ahmadieh & Jradi, 2021). Lifestyle modifications were suggested to reduce perimenopausal symptoms and frequently eliminate the need for medical intervention (Freeman et al., 20214). For instance, the adoption of a heart healthy diet that limits fats, sugar, and salt and promotes whole, unprocessed foods, was proposed to help with symptoms' management (Drewnowski & Almiron-Roig, 2010). Furthermore, regular exercise was reported to help in controlling weight, enhancing mood, and improving sleep. The reduction of alcohol and caffeine may also help to decrease symptoms such as anxiety and hot flashes. During this time of change, stress-reduction methods such as

yoga, meditation, or deep breathing exercises are also useful for fostering mental wellness (Cramer et al., 2013).

Hormonal Replacement Therapy (HRT) is frequently utilized to help ease menopausal symptoms and restore hormone balance in women. Penkriton (2023) reported that hormone replacement therapy can greatly improve the quality of life for women going through perimenopause symptoms. Additionally, Toffol et al. (2015) stated that hormones play a role in mood regulation, since changes during perimenopause may result in heightened anxiety and depression. However, there is still a large group of women who are hesitant to use HRT. In fact, one study found that only 37.6% of perimenopausal women currently use HRT, with decisions influenced by cultural preferences and concerns over side effects (Brozon et al., 2024). Furthermore, numerous women opt for alternative therapies or lifestyle changes instead of hormonal treatments, indicating a complicated relationship between the perceived advantages of HRT and personal choices in health care (Lannon, 1994). Ultimately, fasting could be an alternative, slightly less effective, way of dealing with acute perimenopausal symptoms. However, fasting can have less side effects than HRT and women could be more inclined to adopt it as an intervention.

Research Gaps

Most research studies exploring the effects of fasting on mental health have primarily focused on Ramadan fasting, which may not fully represent the broader category of fasting practices, including intermittent fasting. This emphasis on a singular type of fasting limits our understanding of how different, non-religious, fasting protocols may affect mental health outcomes. Additionally, muslims experience various lifestyle changes during Ramadan, such as alterations in meal times, sleep-wake cycles, mindfulness practices and physical activity levels, all of which can influence hormone levels and psychological well-being (Stec et al., 2023).

Additionally, most of the current research on women's mental well-being in perimenopause and menopause centers on the psychological difficulties linked to hormonal changes, such as higher levels of anxiety and depression. Research shows that these changes can worsen existing mental health problems, especially in women with prior mental health conditions (Stapel et al., 2022). There has also been research on the benefits of fasting on mental health outcomes (Reilly et al., 2023). We found one study by Reilly et al. (2023) that examined the effects of intermittent fasting on working memory of women transitioning into perimenopause. However, they did not investigate the effects on mental health outcomes. While each topic has been studied and investigated separately, there is no research that specifically looks at the intersection of fasting practices and the mental health issues experienced by women during perimenopause.

According to recent research, there are a number of restrictions on fasting's impact on mental health and cognitive abilities. For instance, whereas some studies point to possible advantages of fasting, such as increased cognitive resilience (Mattson et al., 2018), other studies suggest that fasting may be linked to a decline in cognitive functioning (Behav, 2023). It is difficult to make firm conclusions regarding the effects of intermittent fasting on cognition due to the variety of fasting techniques and the scarcity of superior research (Kessler, 2024).

Hypothesis

In comparison to women who do not engage in intermittent fasting, perimenopausal women who practice intermittent fasting, over a period of minimum of 3 months, will report better mental health outcomes, such as improvement in baseline depression and anxiety levels, sleep quality, body satisfaction, and cognitive "fogginess". In addition, we hypothesize that, in comparison to the group that did not engage in intermittent fasting, perimenopausal women who fast will experience improved health outcomes as indicated by healthy BMI and improved sexual health satisfaction.

Objectives

The aim of the study is to assess the impact of a six month intervention involving intermittent fasting on the mental health outcomes of perimenopausal Lebanese women.

The primary outcome includes evaluating the impact of intermittent fasting on the change in baseline score of participants on the depression scale, at 3 months post-intervention.

Secondary outcomes include anxiety level, sleep quality, body image satisfaction, cognitive performance, sexual health as well as the overall Body Mass Index (BMI) of participants.

Significance and Clinical Implications

By focusing on how IF can influence psychological and overall well-being during perimenopause, we seek to develop tailored interventions that address the unique mental health needs of this vulnerable population (Wiss, 2022; Berthlot et al., 2021). Understanding the relationship between IF and mental health can provide valuable insights for supporting women during this critical life stage while contributing to broader discussions about nutrition and mental wellness.

As women look for non-pharmacological ways to handle menopausal symptoms, investigating the impact of fasting may result in innovative, less invasive, approaches to boost mental and overall health. We hope that this study can be a first step in encouraging and shaping alternative methods that promote women's well-being during a challenging and less researched stage of life.

Methodology

Study design

This 6- month labeled customized controlled trial (RCT) will assess how intermittent fasting affects the mental health of perimenopausal women. The purpose of the study is to ascertain whether, in contrast to conventional dietary guidance, an intermittent fasting regimen can result in significant improvements in psychological well-being. In order to accomplish the goals of the study, participants will be randomized into two groups: a control group that will get conventional dietary guidance and an experimental group that will adhere to a 16/8 intermittent fasting regimen. To guarantee fair distribution, a computer-generated randomization technique will be used enabling a direct comparison of the two groups' mental health results.

Participants

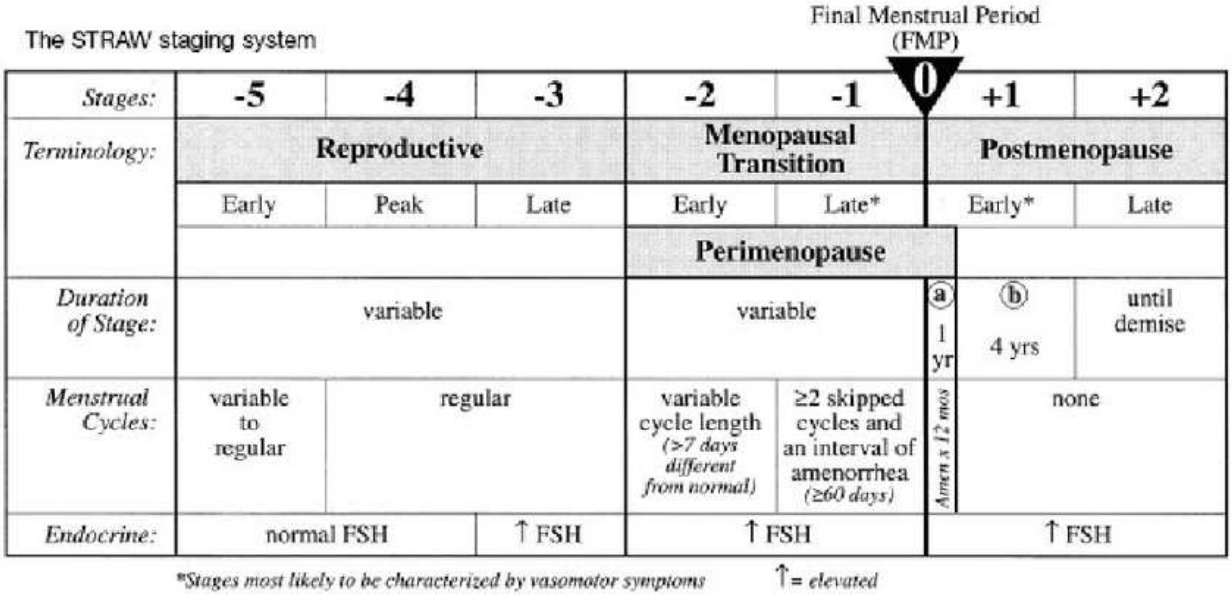
For this study, Lebanese women between the ages of 45 and 55 will be approached at a tertiary care hospital in Lebanon's Family Medicine and OBGYN clinics. Women who are in the perimenopausal stage as defined by the STRAW criteria (stages -2 and -1) and have a Menopause Rating Scale (MRS) score equal or above 11 may be qualified to participate in the study.

The initial stage of menopause is identified by STRAW as having a higher fluctuation in the length of menstrual cycles, with a consistent variance of 7 days or more between consecutive

cycles. Stages -2 signifies the beginning of the early perimenopause transition phase, which eventually advances into stage -1, known as the late perimenopause. Our assessment will not include measuring FSH levels; instead, we will use clinical criteria as shown in figure 1 (see STRAW image below) (Prior et al.,2011). Additionally, the MRS consists of 11 questions assessing the severity of menopausal symptoms in three domains: somatic, psychological, and urogenital. By using this scale, we can identify if a woman has entered perimenopause and thus, assess her eligibility for the study. The patient will need to be cleared by the RN in the clinic and the treating physician needs to agree on the patient starting the fasting intervention.

The exclusion criteria will include women who are on hormone replacement therapy, people with severe illnesses that could prevent fasting (including uncontrolled diabetes, heart disease, hypertension, cancer or kidney issues), and people with current formal mental health diagnosis as diagnosed by DSM V (whether taking medications or not and if in therapy), or women experiencing any type of dementia. Additional exclusions include women experiencing surgical menopause, premature ovarian failure, undergoing chemotherapy, or radiotherapy, ovarian cancer survivors, pregnant women, those undergoing endometriosis treatment, thyroid problems, or on hormone therapy. Participants will be provided with adequate mental health refferal to NGOs and removed from the trial if they exhibit suicidal thoughts (a score of greater than 0 on the PHQ 9 question number 9). Participants who do not speak English will be excluded from this study.

Figure 1. STRAW (Stages of Reproductive Aging Workshop). Prior, Jerilynn & Hitchcoc, Christine. (2011). The endocrinology of perimenopause.



Sample size calculation

To calculate the sample size for this study, we aimed to detect significant changes in depression scores at 3 months post-intervention, as the primary outcome. Assuming an effect size of 3 (Cohen's d), a standard deviation of 5.25, and a significance level of 0.05, we determined that a total of n= 98 participants (n= 49 per group) would be required to achieve 80% statistical power. These parameters are based on a study by Al-Ozairi et al. (2019), which investigated the effects of fasting during the month of Ramadan on depression and diabetes outcomes. Although Ramadan fasting differs from the 16/8 intermittent fasting regimen employed in our study, the

standard deviation of 5.25 on PHQ9 scores from Al-Ozairi et al.'s provides a relevant reference point for our calculations.

Given the estimated dropout rate of 30% in 3 months, we plan to recruit up to a total of 140 participants to ensure adequate statistical power by the end of the study. This approach will allow for a robust statistical analysis and the detection of significant differences between the experimental and control groups over the intervention period.

Procedure

In this six-month parallel- group Randomized Controlled Trial (RCT), perimenopausal Lebanese women's mental health outcomes will be investigated in relation to intermittent fasting.

Women, between the ages of 45 to 55, who fulfill criteria for the perimenopause stages -2 and -1 as per the STRAW criteria and the Menopause Rating Scale (MRS) will be recruited to participate in the study. The nurse at the OBGYN and family medicine clinics at the American University of Beirut Medical Center (AUBMC) will initially approach the participant checking if they are willing to take part in the study, based on age.

Women who show interest will be escorted to a private room by the research assistant (RA) who will go over the informed consent, explaining the study's goal and procedure. Once participants sign the informed consent, they will be asked to fill out a questionnaire created to determine if they qualify for the study (Appendix I). They will also be asked to complete the MRS. We will develop a mechanism whereby the nurse will ask the treating physician whether the participant can actually partake in the fasting intervention. The completion of the two scales and the informed consent will need approximately 20 mins.

After confirming eligibility, participants will complete the required scales, to collect baseline data on their overall symptoms. Their body composition will also be assessed using a bioelectrical impedance device, which will be placed in the site where data collection is happening. This process will take 40 minutes.

Participants will then be assigned at random to either the experimental group or control group. This randomized process will be carried out utilizing a computer- generated randomization scheme. In order to avoid bias in selection, this scheme will be developed prior to recruitment of any participant. Once the participant is given an ID, this will be matched with the database created. The patient will be given their allocation in an envelope and will be asked to present it to the RA. This procedure upholds the study's design integrity and guarantees that group assignments are unbiased.

The experimental group will be provided with instructions on how to follow a 16/8 intermittent regimen: fasting for 16 hours and consuming meals within an 8 hour-period. This group will be asked to track their intermittent fasting routines using a designed schedule (Appendix J). The control group will receive food-based dietary guidelines for Lebanese adults (FBDG English Version.pdf) ,which will be explained by the RA.

One week prior to re-assessment (on weeks 6, 12, 24) individuals will receive an email or phone call to return to the clinic for follow – up visits. During these visits, participants will fill out the scales by themselves in a room to avoid inflating social desirability bias. The RA will only take their body composition and will administer the MoCa test. Both tests cannot be self-administered.

In between these periods, participants in the intervention group will receive weekly phone calls intended to encourage adherence among participants, decrease withdrawal occurrences, and provide individualized motivation for those fasting. These calls will also serve as a check in to make sure that participants who are fasting are not experiencing any side effects such as dizziness, fatigue, low energy levels, or low blood sugar, and excessive weight loss. If they do report any of the aforementioned symptoms, they will be referred to Family Medicine for a free of charge medical consultation. If they are deemed unable to continue the intervention, they will be asked to withdraw from the study.

All participants will be compensated for their 3 additional visits.

Statistical Analysis

We will analyze the data using Statistical Package for Social Sciences (SPSS). Descriptive analysis will be carried out by presenting the number and percentage for categorical variables or the mean and standard deviation for normally distributed continuous variables, or the median and interquartile range (IQR) for skewed continuous variables. The association between the groups and the different continuous variables will be carried out using the independent t-test or the Mann Whitney test, as appropriate. On the other hand, the association between the groups and the different categorical variables will be carried out using the Chi square test or Fishers exact test, as appropriate.

Multivariate linear regression analyses will be carried out to account for confounding variables. The outcome will be the PHQ-9 and the main independent variable will be the intervention group. Factors included in the regression analysis will be selected based on clinical

and statistical grounds. The beta estimate and the 95% confidence interval (CI) will be calculated for this association. Moreover, linear Mixed Effects Modeling will also be used to account for incomplete data.

Finally, the main analysis will be carried out according to the Intent to treat (ITT) to assess the effectiveness of the interval. Moreover, as a secondary analysis, the per protocol analysis will be also carried out to assess the efficacy of the intervention.

Measures

Participants will be initially asked to complete a general questionnaire addressing: Age, area of residency, weight/height, marital status, educational level, number of children, employment status, household's average monthly salary, smoking habits and level of physical activity.

The Patient Health Questionnaire (PHQ-9) (Appendix A) is a self-administered tool designed to screen for depression by evaluating symptoms based on DSM-5 criteria. It consists of nine items scored of "not at all= 0", "several days" = 1, "more than half the days =2", and "nearly everyday =3". The cut-off scores to assess the severity of depression are: "0-4= no depressive symptoms", "5-9= mild depressive symptoms", "10-14= moderate depressive symptoms", " 15-19= moderately severe depressive symptoms", "20-27 = severe depressive symptoms". With coefficients ranging from 0.83 to 0.90 and Cronbahc's alpha of 0.89 to 0.94, the PHQ-9 demonstrates good reliability. This scale has been used in the Arab population and in

two Lebanese studies: Al Jammal (2023) in patients with heart failure and Suwaya et al. (2022) in a Lebanese psychiatric outpatient sample.

The Generalized Anxiety Disorder 7-item scale (GAD-7) (Appendix B) is an instrument designed to assess the severity of generalized anxiety disorder (GAD). Each item prompts individuals to evaluate how often they have been bothered by specific anxiety symptoms over the past two weeks, with response options of "not at all= 0", "several days" = 1, "more than half the days =2", and "nearly everyday =3". The cut-offs are: "0-4= none to minimal anxiety", "5-9= mild anxiety", " 10-14= moderate anxiety", '15-21= severe anxiety". Alpha coefficient is as high as 0.92, which indicates high remarkable internal consistency. Additionally, strong test retest reliability is demonstrated by the intraclass correlation coefficients, which range from 0.83 to 0.92 and indicate score stability over time. This scale has been used in the Arab population and used in a Lebanese study Suwaya et al. (2022) in a Lebanese psychiatric outpatient sample.

The Pittsburgh Sleep Quality Index (PSQI) (Appendix C) is a widely used self-report questionnaire that evaluates sleep quality over a one-month period. It consists of 19 items that generate seven component scores, providing a comprehensive assessment of various aspects of sleep. With an alpha of 0.83 and test retest reliability of 0.85, the PSQI demonstrates good reliability. This scale has been used in the Arab population and used in a Lebanese study by Kabrita and Hajjar-Muca (2016) to assess sleep quality among university students in Lebanon.

The Body Appreciation Scale-2 (BAS-2) (Appendix D) is a 10-item measure designed to assess an individual's acceptance, positive regard, and respect for their own body. Its alpha coefficient is between 0.87 and 0.94 and indicates good internal consistency and strong reliability. Additionally, it endorses strong test-retest reliability with values ranging between 0.80 to 0.88. This scale has been used in the Arab population, including its two-short forms, in Lebanese Arabic-speaking adults, assessing its factor structure, reliability, and validity based on a study done by Fekih-Romdhane and Azzi (2023).

Montreal Cognitive Assessment (MoCa) (Appendix E) consists of a 30-point screening test that assesses cognitive domains. It has a good internal consistency with a Cronbach's alpha of 0.82 to 0.83. The MoCa demonstrates high test-retest reliability with an Intraclass Correlation Coefficient (ICC) of 0.92. The MoCa shows excellent sensitivity (90%) and good specificity (87%) for detecting mild cognitive impairment compared to the Mini-Mental State Examination (MMSE). Also, MoCa has been used in a study in Lebanon which reflects its broader acceptance in our clinical and research setting (Abou-Mrad, 2017).

The Female Sexual Function Index (FSFI) (Appendix F) is a 19-item self-report questionnaire designed to assess sexual functioning in women across six domains: sexual desire, arousal, lubrication, orgasm, satisfaction, and pain associated with vaginal penetration. The FSFI shows strong reliability, with test- retest coefficients ranging from 0.79 to 0.86 and internal consistency (Cronbach's alpha) values of 0.82 or higher. This scale has been used among the Arab population such as the Egyptian population, as detailed by (Anis et al.,2011).

The Menopause Rating Scale (MRS) (Appendix G) is an 11-item questionnaire that evaluates the severity of menopausal symptoms across three domains: somatic, psychological, and urogenital. Respondents rate their symptoms on a 5-point scale with response options "none=0", " mild=1", "moderate=2", "severe=3", "very severe=4", higher scores indicating a greater burden of symptoms. Alpha values are typically above 0.80 and the scale has good test-retest reliability. This scale has been used in the Arab population. Abdelaziz et al. (2022) conducted a study exploring the relationship between sleep quality and menopausal symptoms among Saudi women, and additional studies have validated its use in Egypt.

The International Physical Activity Questionnaire - Short Form (IPAQ) (Appendix H) is a 9-item self-reported measure of physical activity designed for individual patients aged 15 to 69 years. It can be used clinically and in population research to compare physical activity levels across different populations internationally. The IPAQ demonstrated good reliability, with test-retest reliability average coefficient of 0.8, indicating that it is a consistent tool for measuring physical activity over time. This scale has been cross-culturally adapted and used in Arabic-speaking populations. Also, it has been utilized in Kuwait (Garashi et al., 2020) and in Tunisia (Regaieg et al., 2015), supporting its applicability across diverse Arabic-speaking contexts.

Feasibility and Potential Pitfalls

The study might face several limitations. First, participants might withdraw at any point during the study because of negative side effects of fasting or demotivation to engage in the intervention. This would impact our ability to retain data and thus, would impact our results. In order to reduce this risk, we will forecast needing a higher number of participants (up to n=140), in order to ultimately achieve our desired sample size (n=98). Second, with the country's current situation and displacement of people from their homes, recruitment and retention of participants can be more challenging. For that purpose, we will be contacting participants on a weekly basis to provide support and check-ins. Finally, our study is restricted to women who speak English, since some of the scales being used are not translated to Arabic. This is a limitation in our setting and it will limit generalizability of our study, since some women from certain socio-economic and educational backgrounds might not be able to participate. We can improve this limitation in follow up studies, keeping in mind that this is a preliminary study on an understudied topic of interest.

Ethics

The study was submitted for IRB approval on 12/6/2024 (AUB IRB Protocol No.: SBS-2024-0499) and is currently under review.

The risks associated with this research are minimal. Some women might experience distress while reporting on their mental health. Additionally, one of the scales addresses the sexual health of women participating in the study. If the participant does not wish to complete this scale she can inform the RA. In case of any physical side effects experienced from the

fasting intervention, the participants will be referred to family medicine for a check up. If the symptoms are moderate to severe, and based on physician's recommendation, the participant will be asked to withdraw from the intervention.

The benefits of this study outweigh its risks. This study will hopefully provide insights into an under-researched area, which could potentially help women reduce their reliance on medications such as hormonal treatments. By exploring alternative approaches, this study aims to enhance women's mental health while offering them more options for managing their health effectively. We will ensure that women who do not receive the intervention will be given nutritional counseling.

Throughout the study and at baseline , in case participants were determined to suffer from mental health difficulties (score moderate to severe on PHQ 9 equal or above 15 and GAD 7 equal or above 15), they will be offered a referral to a mental health professional. If they wish to start psychotherapy or psychiatric medication, priority will be given to this and will either not be included in the study or asked to withdraw.

Participants are able to withdraw at any point during the study. This will not affect their treatment at AUBMC.

Data from the study will be stored on the PI's password protected computer for up to 3 years after the end of the study.

Budget

- 1 research assistant, full time salary, for 2 years and 6 months will be 25,000$
- Compensation for 140 participants will be 100$ in total per participant for 3 visits (total 14.000$)
- 2 Ipads total 700$
- Total for 3 years= 39,700$

Commitment and Funds

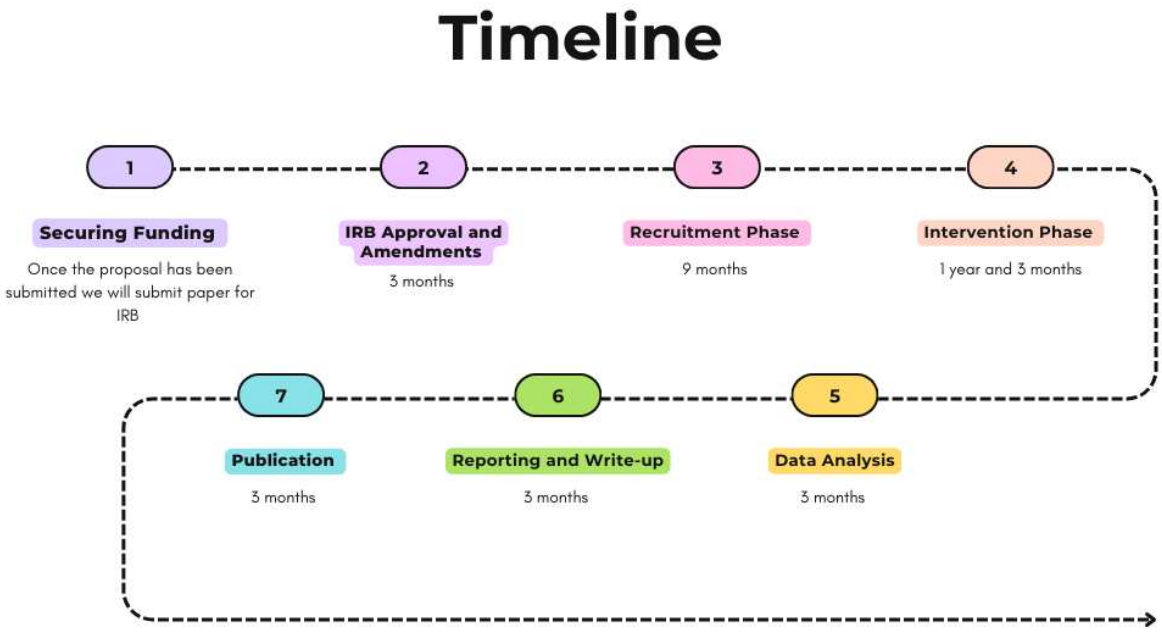
We have not applied for any other funds for this study.

The PI will allocate 20% of her time on this study. She will be involved at all stages of the research. The Co- PI will allocate 15 % of their time on this study. The focus will be on actively engaging in conversation related to the recruitment and procedure phase. They will also be involved in editing and reviewing the results and discussion sections of the study. The collaborators will allocate 5-10 % of their time on this study mainly focusing on helping with specific elaboration of topics and providing expert opinion during the procedure phase and data analysis phase.

The PI is currently involved in 2 other research projects as PI. First one is on 'Smoking prevalence in a psychiatric inpatient unit in Lebanon: The profiles of smokers and their smoking cessation method preference' and second one is 'Prevalence of Perinatal Depression of Pregnant Patients Hospitalized at AUBMC, Lebanon: a Pilot Study'. In the first study we are in the recruitment phase and in the second study we are in the data analysis stage.

Timeline

Figure 2. Timeline of study over 3 years



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Appendices

Appendix A: Patient Health Questionnaire (PHQ-9)

	Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half of the days	Nearly everyday
	Depression Screening				
1	Little interest or pleasure in doing things	0	1	2	3
2	Feeling down, depressed, or hopeless	0	1	2	3
	PHQ-9 Depression Assessment				
3	Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4	Feeling tired or having little energy	0	1	2	3
5	Poor appetite or overeating	0	1	2	3
6	Feeling bad about yourself - or that you are a failure or have let yourself or your family down	0	1	2	3
7	Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8	Moving or speaking so slowly that other people could have noticed, or the opposite - being so fidgety or restless that you have been moving a lot more than usual	0	1	2	3
9	Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3
10	If you check off any of these problems how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people? 0 - Not difficult 1 - Somewhat difficult 2 - Very difficult 3 - Extremely difficult	0	1	2	3

Appendix B: Generalized Anxiety Disorder 7-item Scale (GAD-7)

GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

(For office coding: Total Score T____ = ____ + ____ + ____)

Appendix C: Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. When have you usually gotten up in the morning? _____
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) _____

5. During the past month, how often have you had trouble sleeping because you...	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

Component 1	#9 Score	C1_____
Component 2	#2 Score (≤15min=0; 16-30 min=1; 31-60 min=2, >60 min=3) + #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3)	C2_____
Component 3	#4 Score (>7=0; 6-7=1; 5-6=2; <5=3)	C3_____
Component 4	(total # of hours asleep)/(total # of hours in bed) x 100 >85%=0, 75%-84%=1, 65%-74%=2, <65%=3	C4_____
Component 5	Sum of Scores #5b to #5j (0=0; 1-9=1; 10-18=2; 19-27=3)	C5_____
Component 6	#6 Score	C6_____
Component 7	#7 Score + #8 Score (0=0; 1-2=1; 3-4=2; 5-6=3)	C7_____

Add the seven component scores together _____ **Global PSQI Score** _____

Buysse, D.J., Reynolds III, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Journal of Psychiatric Research, 28*(2), 193-213.

Appendix D: Body Appreciation Scale (BAS-2)

Body Appreciation Scale-2 (BAS 2)

Please indicate whether the question is true about you never, seldom, sometimes, often, or always.

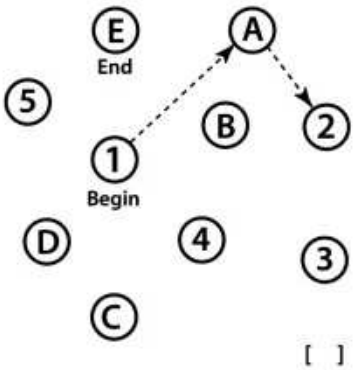
S.No	Statement	Never	Seldom	Sometimes	Often	Always
1	I respect my body.	1	2	3	4	5
2	I feel good about my body.	1	2	3	4	5
3	On the whole, I am satisfied with my body.	1	2	3	4	5
4	Despite its flaws, I accept my body for what it is.	1	2	3	4	5
5	I feel that my body has at least some good qualities.	1	2	3	4	5
6	I take a positive attitude toward my body.	1	2	3	4	5
7	I am attentive to my body's needs.	1	2	3	4	5
8	My self-worth is independent of my body's shape and weight.	1	2	3	4	5
9	I do not focus a lot of energy being concerned with my body's shape or weight.	1	2	3	4	5
10	My feelings toward my body are positive for the most part.	1	2	3	4	5
11	I engage in healthy behaviors to take care of my body.	1	2	3	4	5
12	I do not allow unrealistically thin images of women/ men presented in the media to affect my attitudes toward my body.	1	2	3	4	5
13	Despite its imperfections, I still like my body.	1	2	3	4	5

Appendix E: Montreal Cognitive Assessment (MoCa)

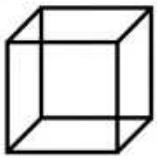
MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

NAME :
Education :
Sex :
Date of birth :
DATE :

VISUOSPATIAL / EXECUTIVE



Copy cube



[ ] [ ]

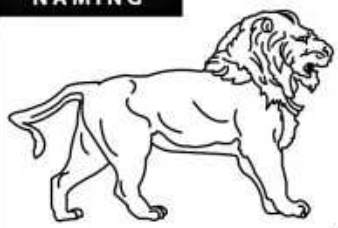
Draw CLOCK (Ten past eleven)
(3 points)

[ ] Contour [ ] Numbers [ ] Hands

POINTS

__/5

NAMING



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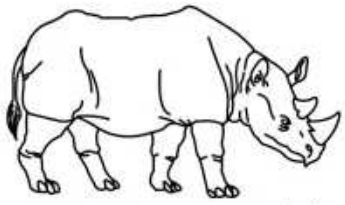

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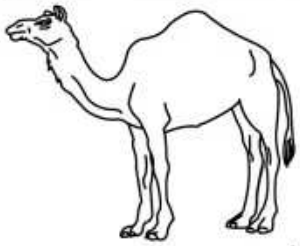


[ ]

__/3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4
Subject has to repeat them in the backward order [ ] 7 4 2

__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

__/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

__/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]
The cat always hid under the couch when dogs were in the room. [ ]

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words)

__/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

__/2

DELAYED RECALL

	Has to recall words WITH NO CUE	FACE [ ]	VELVET [ ]	CHURCH [ ]	DAISY [ ]	RED [ ]	Points for UNCUED recall only
Optional	Category cue						
	Multiple choice cue						

__/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

__/6

© Z.Nasreddine MD **www.mocatest.org** Normal ≥ 26 / 30

TOTAL __/30

Add 1 point if ≤ 12 yr edu

Administered by: _____

Appendix F: Female Sexual Index (FSFI)

FSFI SCORING APPENDIX

Question	Response Options
1. Over the past 4 weeks, how **often** did you feel sexual desire or interest?	5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
2. Over the past 4 weeks, how would you rate your **level** (degree) of sexual desire or interest?	5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
3. Over the past 4 weeks, how **often** did you feel sexually aroused ("turned on") during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
4. Over the past 4 weeks, how would you rate your **level** of sexual arousal ("turn on") during sexual activity or intercourse?	0 = No sexual activity 5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
5. Over the past 4 weeks, how **confident** were you about becoming sexually aroused during sexual activity or intercourse?	0 = No sexual activity 5 = Very high confidence 4 = High confidence 3 = Moderate confidence 2 = Low confidence 1 = Very low or no confidence
6. Over the past 4 weeks, how **often** have you been satisfied with your arousal (excitement) during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never

Appendix G: Menopause Rating Scale

Menopause Rating Scale

Which of the following symptoms apply to you at this time?
Please mark the appropriate box for each symptom.
For symptoms that do not apply, please mark 'none'.

SYMPTOMS:	SCORE =	NONE 0	MILD 1	MODERATE 2	SEVERE 3	VERY SEVERE 4
1. Hot flushes, sweating (episodes of sweating)		○	○	○	○	○
2. Heart discomfort (unusual awareness of heart beat, heart skipping, heart racing, tightness)		○	○	○	○	○
3. Sleep problems (difficulty in falling asleep, difficulty in sleeping through, waking up early)		○	○	○	○	○
4. Depressive mood (feeling down, sad, on the verge of tears, lack of drive, mood swings)		○	○	○	○	○
5. Irritability (feeling nervous, inner tension, feeling aggressive)		○	○	○	○	○
6. Anxiety (inner restlessness, feeling panicky)		○	○	○	○	○
7. Physical and mental exhaustion (general decrease in performance, impaired memory, decrease in concentration, forgetfulness)		○	○	○	○	○
8. Sexual problems (change in sexual desire, in sexual activity and satisfaction)		○	○	○	○	○
9. Bladder problems (difficulty in urinating, increased need to urinate, bladder incontinence)		○	○	○	○	○
10. Dryness of vagina (sensation of dryness or burning in the vagina, difficulty with sexual intercourse)		○	○	○	○	○
11. Joint and muscular discomfort (pain in the joints, rheumatoid complaints)		○	○	○	○	○

Appendix H: International Physical Activity Questionnaire- Short Form

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ **days per week**

   ☐ No vigorous physical activities → ***Skip to question 3***

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ **hours per day**

   _____ **minutes per day**

   ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ **days per week**

☐ No moderate physical activities → ***Skip to question 5***

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking → ***Skip to question 7***

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **week day**?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Appendix I: Demographics Questionnaire

1. Demographics

1. What is your age? *

Your answer

2. Where is your area of residency? *

Your answer

3. What is your height? *

Your answer

4. What is your current weight (in Kg)? *

Your answer

5. What is your marital status? *

- ◯ Single
- ◯ Married
- ◯ Divorced
- ◯ Widowed

6. How many children do you have? *

Your answer

7. What is your highest educational level? *

- ◯ High School
- ◯ Bachelor's Degree
- ◯ Master's Degree
- ◯ PhD
- ◯ Other (Please specify)
- ◯ Other: _____

8. What is your current employment status? *

- ◯ Employed Full-Time
- ◯ Employed Part-Time
- ◯ Unemployed
- ◯ Retired
- ◯ Other: _____

9. What is your household's monthly income? *

- ◯ <$1000
- ◯ $1000 - $2000
- ◯ $2000 - $3000
- ◯ >$3000
- ◯ Other: _____

10. Do you smoke? *

- ◯ Yes, I am a current smoker
- ◯ No, but I used to smoke
- ◯ No, I have never smoked
- ◯ Other: _____

11. How would you describe your physical activity level? *

- ◯ Low (Less than 30 min/week)
- ◯ Moderate (30-150 min/week)
- ◯ High (More than 150 min/week)
- ◯ Other: _____

12. Which stage of menopause are you currently in according to the STRAW criteria? *

- ◯ Early Transition (Increased variability in menstrual cycles)
- ◯ Late Transition (Skipped cycles, amenorrhea for more than 60 days)
- ◯ Other: _____

2. Medical History and Exclusions

13. Have you been diagnosed with any of the following conditions? *(Select all that apply)* *

- [ ] Cardiovascular disease
- [ ] Cancer
- [ ] Diabetes
- [ ] Hypertension
- [ ] Cognitive decline/dementia
- [ ] None of the above
- [ ] Other (Please specify)
- [ ] Other: _____

14. Are you currently taking medication for any of these conditions? *

- ◯ Yes
- ◯ No
- ◯ If yes, please specify:
- ◯ Other: _____

15. Do you have pre-existing mental health conditions (e.g., depression, anxiety disorders, etc.)? *

- ◯ Yes
- ◯ No
- ◯ If yes, please specify:
- ◯ Other: _____

3. Mental Health & Well-being

16. PHQ-9 Depression Scale

- ◯ Option 1

17. GAD-7 Anxiety Scale

- ◯ Option 1

18. Pittsburgh Sleep Quality Index (PSQI)

- ◯ Option 1

19. Female Sexual Index (FSFI)

Your answer

20. How often do you experience difficulty in memory or concentrating (cognitive fogginess) *

- ◯ Never
- ◯ Rarely
- ◯ Sometimes
- ◯ Often
- ◯ Always
- ◯ Other: _____

21. Body Appreciation Scale (BAS-2)

- ◯ Option 1

4. Intermittent Fasting & Dietary Habits

22. Are you familiar with the concept of intermittent fasting (IF)? *

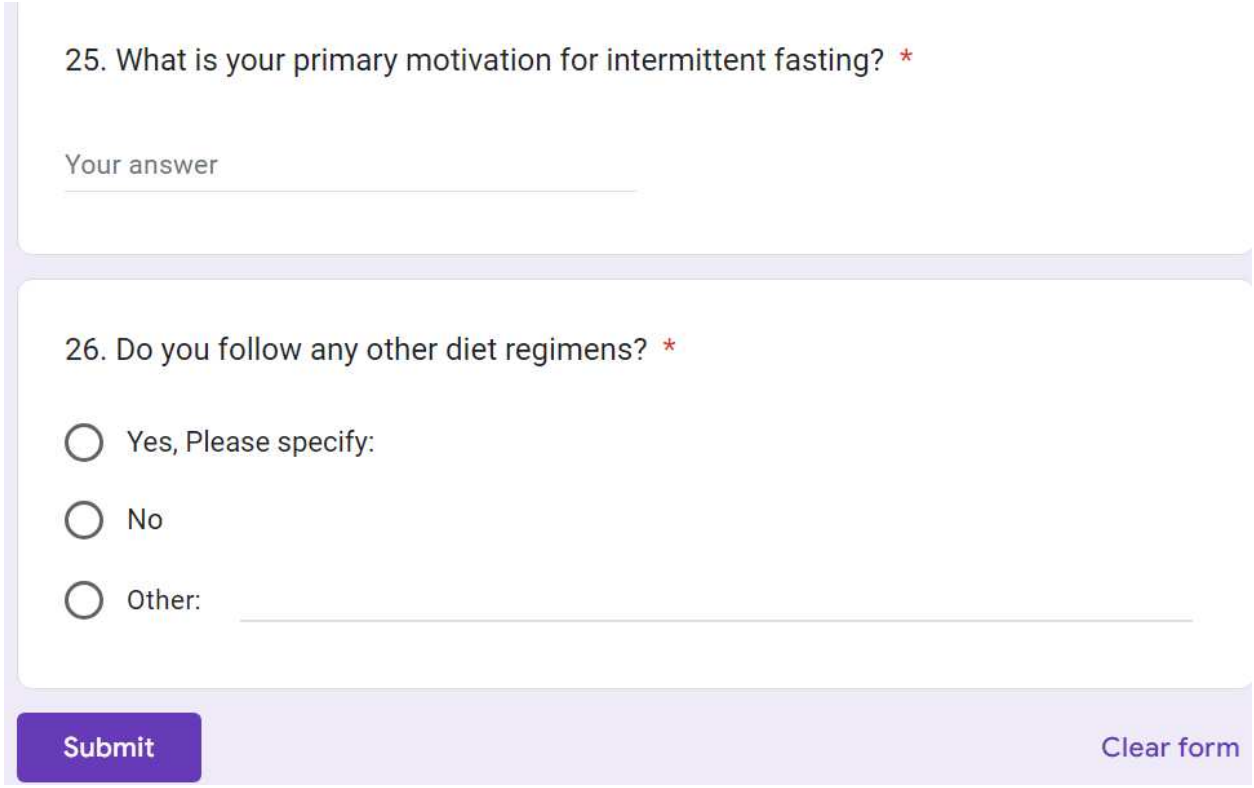
- ◯ Yes
- ◯ No

23. Have you ever practiced intermittent fasting before? *

- ◯ Yes
- ◯ No

24. If yes, how often do you practice intermittent fasting? *

- ◯ Daily
- ◯ 2-3 times a week
- ◯ Once a week
- ◯ Occasionally
- ◯ Other: _____



Appendix J: Intermittent Fasting Tracker

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Start of fasting							

time (am/pm)							
End of fasting time (am/pm)							
Notes							