

## ME-WEL PROJECT: EXPLORING UNDERLYING WEIGHT GAIN FACTORS DURING MENOPAUSAL TRANSITION

### PROJETO ME-WEL: EXPLORAÇÃO DOS FATORES SUBJACENTES AO AUMENTO DE PESO NA MENOPAUSA

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**Abstract:** Women often experience weight gain during the menopausal transition, which can be influenced by personal (e.g., estrogen decrease), environmental (e.g., socio-cultural), and/or behavioural factors (e.g., unhealthy behaviours). This weight gain can lead to obesity and is associated with health problems. Qualitative studies provide valuable insights into the weight gain experience. This study aims to explore the underlying factors contributing to weight gain during the menopausal transition. Semi-structured interviews of 31 Portuguese post-menopausal women who transitioned from normal weight in pre-menopause to overweight/obesity in (current) post-menopause. The interviews were analysed using MAXQDA software through Directed Content Analysis, followed by multiple correspondence analysis, through IBM SPSS Statistics software. A four-factor model emerged: (1) Emotional eating/Cravings, Physical inactivity, and Pandemic effects ( $\sigma_2=14.21$ ;  $\alpha=0.70$ ); (2) Health, Lack of self-care, and Stressful life events ( $\sigma_2=12.29$ ;  $\alpha=0.64$ ), (3) Biological/Physiological factors, Binge eating, and Interpersonal influences ( $\sigma_2=10.82$ ;  $\alpha=0.59$ ), and (4) Changing habits and routines, and Work Environment ( $\sigma_2=9.65$ ;  $\alpha=0.53$ ). The four-factor model aligns with the Triadic Reciprocal Determinism Model, revealing an interaction among behavioural, personal, and environmental factors explaining weight gain during the menopausal transition. Promoting healthy lifestyles within this population is essential. Future interventions for middle-aged women should include cognitive-behavioural strategies.

**Keywords:** Menopausal women, Menopause, Obesity, Qualitative approach, Weight gain

**Resumo:** Durante a transição para a menopausa, é frequente as mulheres experienciarem um aumento de peso, que pode ser influenciado por fatores pessoais (e.g., decréscimo dos níveis de estrogénio), ambientais (e.g., socioculturais) e/ou comportamentais (e.g., comportamentos não saudáveis). Esse aumento de peso pode conduzir ao desenvolvimento da obesidade e, conseqüentemente, problemas de saúde associados. Estudos qualitativos providenciam informações cruciais sobre a experiência de aumento de peso. Este estudo tem como objetivo explorar os fatores subjacentes ao aumento de peso durante a transição para a menopausa. Foram feitas entrevistas semiestruturadas a 31 mulheres portuguesas na pós-menopausa, que na pré-menopausa tinham peso normal e na pós-menopausa tinham excesso de peso/obesidade. As entrevistas foram analisadas com o software MAXQDA, através de uma análise de conteúdo dirigida, seguida de análise de correspondência múltipla, através

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do software IBM SPSS Statistics. Emergiu um modelo final de quatro fatores: (1) Ingestão emocional/Cravings, Inatividade física e Efeitos da pandemia ( $\sigma^2=14,21$ ;  $\alpha=0,70$ ); (2) Saúde, Ausência de autocuidado e Eventos de vida stressantes ( $\sigma^2=12,29$ ;  $\alpha=0,64$ ), (3) Fatores biológicos/fisiológicos, Binge eating e Influências interpessoais ( $\sigma^2=10,82$ ;  $\alpha=0,59$ ), e (4) Mudança de hábitos e rotinas e Ambiente profissional ( $\sigma^2=9,65$ ;  $\alpha=0,53$ ). O modelo de quatro fatores vai de encontro ao modelo triádico de determinismo recíproco, revelando uma interação entre fatores comportamentais, pessoais e ambientais que explicam o aumento de peso durante a transição para a menopausa. É essencial promover estilos de vida saudáveis nesta população específica. Futuras intervenções para mulheres de meia-idade devem incluir estratégias cognitivo-comportamentais.

*Palavras-Chave:* Método qualitativo, Aumento de peso, Menopausa, Mulheres na menopausa, Obesidade

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Weight gain is one of the most prevalent symptoms associated with menopause, contributing to a higher incidence of obesity among postmenopausal women (Monteleone et al., 2018; Zheng et al., 2017). Approximately 66% of women aged 40 to 59 have overweight (Kapoor et al., 2017). The extent of weight gain during this stage, regardless of a woman's initial weight in early adulthood, significantly increases the risk of various health issues (e.g., cardiovascular disease, which is the leading cause of death among postmenopausal women) and decreases the likelihood of experiencing healthy aging (Kapoor et al., 2017; Zheng et al., 2017). Additionally, postmenopausal women tend to experience more severe menopausal symptoms (Al-Safi & Polotsky, 2015; Leitão et al., 2021) and are more susceptible to negative emotional and psychosocial states (e.g., psychological distress, negative self-image, strained intimate-partner relationship; Ali et al., 2020; Kapoor et al., 2017; Pimenta et al., 2014).

Studies suggest that changes in body composition (e.g., increased visceral adiposity) and the process of weight gain can be attributed to several factors. These factors include physiological/biological processes, such as the menopausal process and its related symptoms (e.g., sleep disturbances) and hormonal changes (e.g., estrogen deprivation), chronological aging, genetic predisposition, and pre-existing health problems. Additionally, personal factors (e.g., lower levels of education, heightened body shape concerns), psychological factors (e.g., mood disorders, recent psychological problem, elevated stress levels), behavioural factors (e.g., changes in lifestyle involving reduced physical activity and unhealthy eating habits), and environmental conditions (e.g., work settings; Al-Safi & Polotsky, 2015; Kapoor et al., 2017; Monteleone et al., 2018; Namazi et al., 2019; Naser et al., 2022; Pimenta et al., 2014).

Despite the extensive research on this topic, some authors suggest that the complex connections between obesity, weight gain, and the menopausal transition are not yet fully understood (Al-Safi & Polotsky, 2015). Hence, it is imperative to continue investigating this specific population, as a one-size-fits-all approach to menopause management, including addressing symptoms (e.g., weight gain), proves ineffective (Namazi et al., 2019; Talaulikar, 2022). Several individual factors, including sociodemographic characteristics and cultural variables, impact menopause management and, by extension, weight-related concerns, emphasizing the need for personalized approaches (Namazi et al., 2019). In addition to this, qualitative studies hold promise in providing valuable insights into the experience of weight gain during the menopausal transition. They excel in three critical aspects: (i) providing in-depth descriptions of the phenomena under scrutiny, considering each participant's unique experiences, (ii) contextualizing these experiences within the broader context of menopausal weight gain, and (iii) accounting for individual characteristics, past experiences, and cultural interpretations (Rahman, 2016). Recognizing that each woman's journey through the menopausal transition is distinct (Shamsalizadeh et al., 2023; Talaulikar, 2022), this study aims to explore the

underlying factors contributing to weight gain during the menopausal transition in a sample of Portuguese post-menopausal women.

### METHOD

#### *Participants*

This cross-sectional and exploratory study employed a non-probabilistic sampling method, involving 34 post-menopausal Portuguese women; however, three women were excluded, resulting in a final sample of 31 post-menopausal women. The specific inclusion criteria encompassed the following parameters: (i) biological sex (women), (ii) Portuguese nationality, (iii) ages ranging from 45 to 65 years, (iv) post-menopausal status, defined as the cessation of menstruation for at least a continuous 12-month period following the last menstrual cycle (Harlow et al., 2012), and (v) meeting the Body Mass Index (BMI) criteria – participants who experienced weight gain, transitioning from a healthy pre-menopausal weight range ( $18.5 \text{ kg/m}^2 \leq \text{BMI} \leq 24.9 \text{ kg/m}^2$ ) to an overweight or obesity post-menopausal weight range ( $\text{BMI} \geq 25 \text{ kg/m}^2$ ) in their current post-menopausal state.

#### *Material*

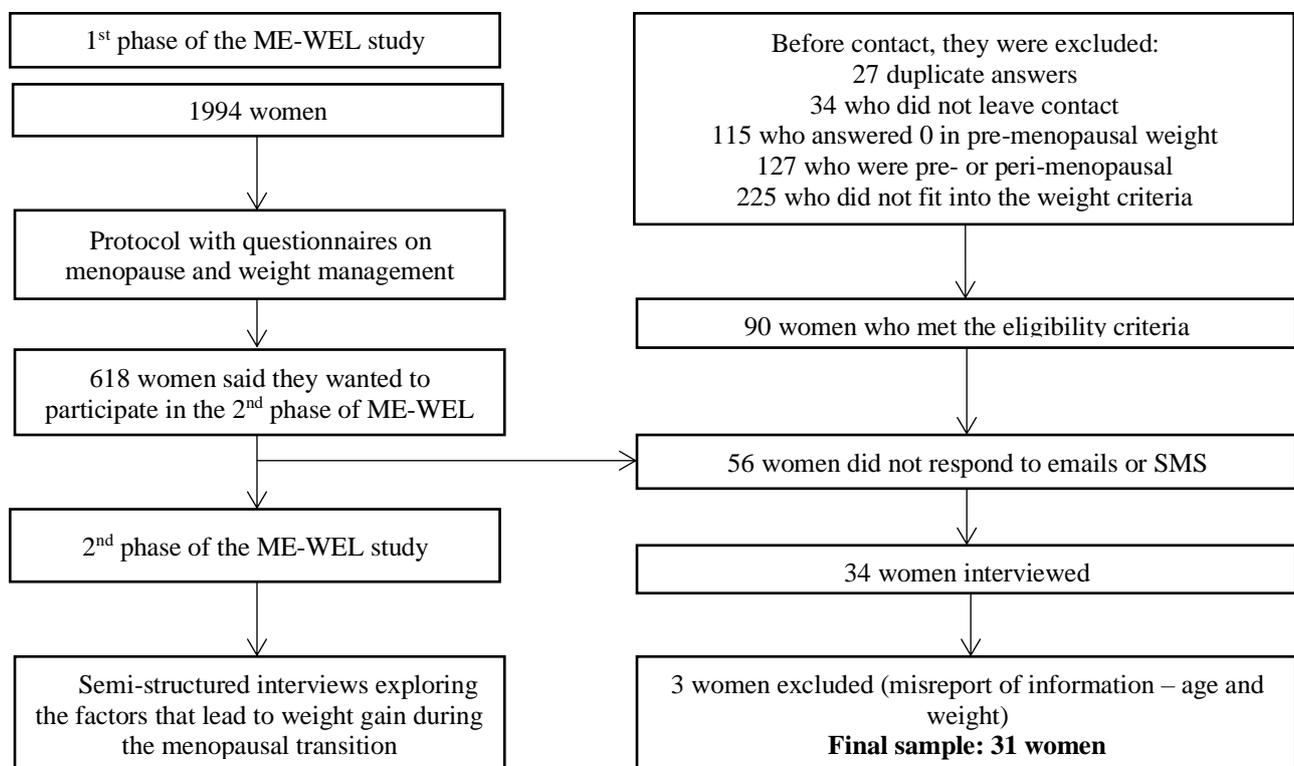
Participants completed a sociodemographic questionnaire, providing information on various aspects, including sociodemographic factors (e.g., number of children), health-related information (e.g., psychological problem), and lifestyle factors (e.g., engagement in physical activity/exercise). To calculate BMI ( $\text{weight [kg]/height[m]}^2$ ), self-reported data on weight and height were collected, focusing on their current weight, weight during pre-menopause, and weight one year after their last menstrual period (post-menopause).

A semi-structured interview was conducted following a predefined protocol. It is worth noting that this interview protocol was initially designed for a more extensive investigation as part of the ME-WEL (MEnopause and WEight Loss) project. This part of the study focused on factors associated with weight gain which was explored with questions such as “What happened (inside you or around you) that contributed to your weight gain during the transition from pre- to post-menopause?”. These questions allowed for an in-depth exploration of each woman’s weight experience, aligning with the primary research objective of comprehensively understanding the factors contributing to weight gain during the menopausal transition.

#### *Procedure*

The ME-WEL project was approved by the Ethics Committee of ISPA–Instituto Universitário (ref. D/024/01/2020), following the guidelines of the Portuguese Psychologist Association (2011) and the American Psychological Association (2003). The initial participant recruitment phase, between May and December 2020, marked the inception of the ME-WEL project, which involved an online survey focused on menopause and weight management constructs. Upon completing the questionnaire, women who expressed interest in participating in the study’s second phase were invited to provide their contact details. A comprehensive overview of the entire recruitment process is presented in Figure 1. The final sample comprised 31 post-menopausal women who reported experiencing weight gain during the menopausal transition.

The interviews, conducted during the pandemic, took place between December 2020 and February 2021. They were conducted by the first author and were carried out either via telephone ( $n = 28$ ) or on Zoom ( $n = 6$ ), based on the participant's preference. The average interviews duration was 23 minutes, with a range of 13 to 40 minutes ( $M = 23.02$ ,  $SD = 7.57$ ). No specific time constraints were imposed during the interviews. Before the interviews, the research objectives were clarified, and participants provided informed consent. Furthermore, participants were requested to grant permission to record the interviews. The interviews were audio-recorded and later transcribed to capture verbal and non-verbal elements (e.g., pauses, laughs). The initial transcription process took place from January to March 2021, followed by a comprehensive review conducted by the first author in April and May 2021. Each interview was assigned a unique alphanumeric code to ensure participant anonymity. The data coding process underwent a thorough review by two members of the research team. Initially, one of the authors conducted independent coding (ML). Subsequently, both authors (ML and FP) collaborated to ensure accurate categorization through clarifications and code refinements.



**Figure 1.** The recruitment process of interview participants.

### *Data analysis*

The interview content underwent qualitative deductive-dominant analysis (Hsieh & Shannon, 2005). The analysis was conducted using MAXQDA 2020 software between May 2021 and April 2022. The primary objective of this analysis was to provide conceptual support and expand upon existing theoretical frameworks. While it was guided by predefined categories, emergent content was also considered, which could lead to the creation of new primary categories. Consequently, the category "Weight gain factors during the menopausal transition" emerged independently of the theoretical model used in the ME-WEL project. The directed content analysis followed a structured process, beginning with an open-ended question (in this case, concerning factors contributing to

weight gain) and subsequently transitioning to more targeted questions related to predetermined categories (Hsieh & Shannon, 2005), in line with the approach employed in the ME-WEL project.

Furthermore, a Multiple Correspondence Analysis (MCA), a multivariate statistical method, was applied. MCA was employed to explore associations between categorical variables (which indicated whether each category is either present or absent) in a considerable number of individual responses (Greenacre & Blasius, 2006). MCA, as an exploratory data analysis, yields factorial dimensions that contribute to a more comprehensive understanding of the phenomenon compared to individual variables. The MCA analysis was conducted using SPSS Statistics (version 28) and focused on the subcategories of “Weight gain factors during the menopausal transition” endorsed by a minimum of 10% of the sample, which equates to at least three participants. Additionally, each dimension was required to explain a minimum of 5% of the total variance and have a minimum eigenvalue of 1. To ensure data reliability, Cronbach's alpha values were assessed, with the reference threshold set at  $\geq 0.7$  (Johnson and Wichern, 2007).

## RESULTS

### *Participants*

Post-menopausal women included in this study had an average age of 54.75 years ( $SD = 4.73$ ). Most women were in a relationship ( $n = 23$ ; 74.2%) and had children ( $n = 25$ ; 80.6%). The highest level of education attained by the majority was either high school ( $n = 12$ ; 38.7%) or a bachelor's degree ( $n = 11$ ; 35.5%). Additionally, a significant proportion reported an annual household income above 20.001€ ( $n = 22$ ; 71%). The majority were professionally active ( $n = 24$ ; 77.4%).

Regarding health status, the majority did not report any physical issues ( $n = 20$ ; 64.5%) or psychological problems ( $n = 22$ ; 71%). While most did not have a family history of obesity ( $n = 21$ ; 67.7%), the partner's BMI differed, with some in the normal weight range ( $n = 12$ ; 52.2%) and others with overweight/obesity ( $n = 11$ ; 47.8%).

Additionally, the average current BMI was 28.23 ( $SD = 2.34$ ). During pre-menopause, these women had an average BMI of 22.60 ( $SD = 1.51$ ). Menopause onset occurred at an average of 48.32 years ( $SD = 4.34$ ). A substantial majority of the women ( $n = 23$ ; 74.2%) indicated their efforts to lose weight, with the practice of physical activity/exercise being common among them ( $n = 22$ ; 71%).

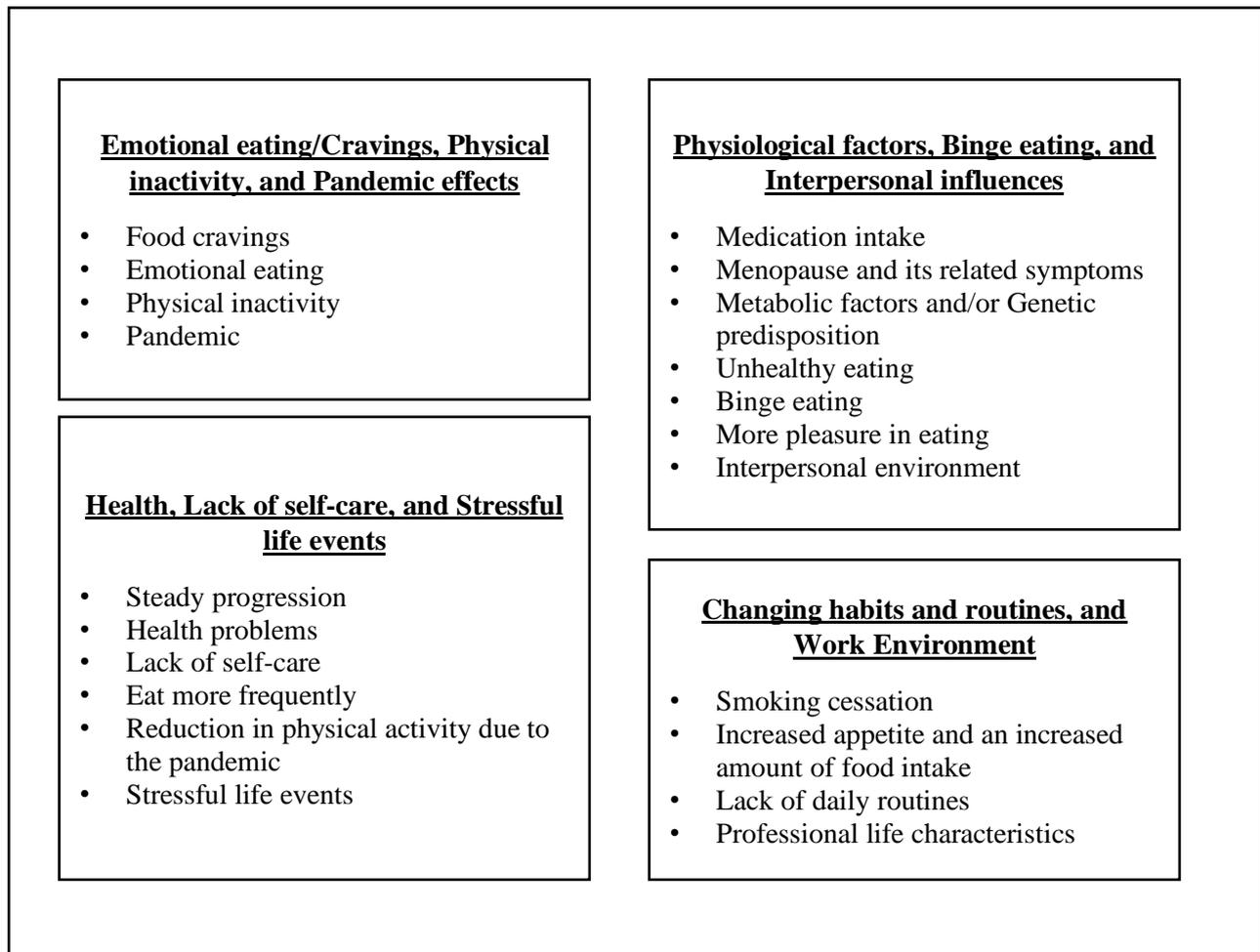
### *Qualitative Analysis*

The qualitative analysis of the category “Weight gain factors during the menopausal transition” identified a total of 21 sub-categories, which encompassed 372 coded segments. These 21 sub-categories were further grouped into (1) Personal factors (5 sub-categories), (2) Behavioural factors (12 sub-categories), and (3) Environmental factors (4 sub-categories). Table 1 provides an overview of the sub-categories associated with the main category. Each sub-category includes a definition and an example, along with details about the code's frequency: the number of participants who mentioned the code ( $n$ ), the corresponding percentage (%), and the total code mentions (NM). Each sub-category was mentioned by more than 10% of the sample.

*Multiple correspondence analysis*

Each subcategory was dichotomized into nominal variables (0 and 1) based on its absence or presence. Following this, a MCA was conducted, resulting in the development of a four-dimensional framework for “Weight gain factors during the menopausal transition”. Detailed statistical information, including factor loadings, variance, Cronbach's alpha ( $\alpha$ ), eigenvalue, and inertia values, is presented in Table 1.

Figure 2 displays the map featuring the final four-dimensional model of the underlying weight gain factors during the menopausal transition.



**Figure 2.** The final four-dimensional model of the underlying weight gain factors during the menopausal transition.

## Weight Gain Factors During Menopausal Transition

**Table 1.** Four-dimensional model exploring the underlying factors contributing to weight gain during the menopausal transition, in women who have transitioned from a healthy pre-menopausal weight to post-menopausal overweight or obesity.

Sub-categories names	Sub-category definition	Example	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Average	n* (NM) **	%***
<b>Personal factors</b>									
Steady progression	Weight gain was perceived as a gradual process.	“I began to gradually gain [weight], and recently, the increase has become more noticeable”; 58Y; BMI=26.3	.160	<b>.292</b>	.016	.069	.134	14 (23)	45.6
Health problems	Weight gain was attributed to health issues (e.g., digestive problems).	“[During that period] I experienced a severe episode of depression, which led to my hospitalization”; 64Y; BMI=33.7	.092	<b>.137</b>	.028	.005	.065	9 (11)	29
Medication intake	Weight gain was attributed to medication intake (including hormone replacement therapy).	“There was also the medication, which I don't know if it had any interference because I started taking an anti-depressant and it was concomitant [with the weight gain]”; 61Y; BMI=26.2	.020	.025	<b>.050</b>	.022	.029	7 (18)	22.6
Menopause and its related symptoms	Weight gain was attributed to the menopausal process and/or its related symptoms.	“It all began [the weight gain] when I started experiencing hot flushes”; 53Y; BMI=27.9	.079	.093	<b>.220</b>	.161	.138	18 (42)	58.1
Metabolic factors and/or Genetic predisposition	Weight gain was attributed to metabolic factors (e.g., slower metabolism) and/or a genetic predisposition.	“(…) Now I haven't done anything to gain weight either. So, it's our nature that influences us in this way.”; 56Y; BMI=26	.113	.004	<b>.157</b>	.017	.073	6 (9)	19.4
<b>Behavioural factors</b>									
Smoking cessation	Weight gain was attributed to smoking cessation.	“(…) and the fact that I quit smoking has also resulted in me being approximately 20 kilos overweight.”; 53Y; BMI=32.3	.006	.099	.024	<b>.500</b>	.157	5 (14)	16.1
Lack of self-care	Weight gain was attributed to a lack of self-care.	“I was widowed with two young daughters, and so it was always the children first. My focus was on my daughters, and I was left behind”; 56Y; BMI=26.2	.112	<b>.497</b>	.038	.020	.167	10 (15)	32.3
Unhealthy eating	Weight gain was attributed to unhealthy eating (including consuming the wrong types of foods).	“I believe it was mainly poor food choices”; 52Y; BMI=26.8	.063	.137	<b>.320</b>	.000	.130	12 (20)	38.7
Food cravings	Weight gain was attributed to a specific type of disordered eating behaviour (i.e., food cravings).	“(…) experiencing those cravings, the constant urge to snack”; 49Y; BMI=29.6	<b>.315</b>	.001	.289	.033	.160	11 (32)	35.5
Binge eating	Weight gain was attributed to a specific type of disordered eating behaviour (i.e., binge eating).	“At night, I would become hungry, and all I wanted to do was eat, eat, eat. But then, I would feel sick because I'd become too full, and I felt stuffed”; 50Y; BMI=27.1	.015	.151	<b>.294</b>	.001	.115	8 (13)	25.8
Emotional eating	Weight gain was attributed to a specific type of disordered eating behaviour (i.e., emotional eating).	“We know that when we're not in a good psychological state, when we're not calm when we're not balanced, we compensate with food, and that's likely why I gained weight”; 59Y; BMI=27	<b>.505</b>	.001	.001	.024	.133	10 (21)	32.3

More pleasure in eating	Weight gain was attributed to an increased pleasure in eating.	“It has changed significantly! A lot, a lot. What I experienced during this transition from pre- to post-menopause, and throughout menopause, was an increased enjoyment of eating(...) more pleasure in food”; 59Y; BMI=27	.020	.063	<b>.299</b>	.096	.120	3 (9)	9.7
Increased appetite and an increased amount of food intake	Weight gain was attributed to an increased appetite, leading to a subsequent increase in the amount of food intake.	“I experienced a noticeable increase in appetite that I believe contributed to this weight gain”; 61Y; BMI=26.2	.039	.015	.001	<b>.169</b>	.056	13 (27)	41.9
Eat more frequently	Weight gain was attributed to more frequent eating (e.g., increased number of meals or snacks throughout the day).	“(…) I started eating between lunch and dinner, for example, and these little things...”; 61Y; BMI=26.2	.101	<b>.300</b>	.008	.008	.104	4 (5)	12.9
Lack of daily routines	Weight gain was attributed to a lack of daily routines.	“(…) I don't sit down to have lunch or dinner every day. I lack the routine of waking up and having breakfast immediately. Sometimes I wake up hungry and prepare two eggs, while other times I might not eat for 3 or 4 hours”; 61Y; BMI=26.2	.000	.124	.076	<b>.244</b>	.111	3 (8)	9.7
Physical inactivity	Weight gain was attributed to physical inactivity.	“I also stopped going for walks, something I used to do frequently. So that didn't help”; 55Y; BMI=29.4	<b>.275</b>	.001	.019	.248	.136	11 (28)	35.5
Reduction in physical activity due to the pandemic	Weight gain was attributed to a decrease in physical activity, which can be due to the pandemic.	“(…) The issue of being so closed off without walking. Although I didn't go to the gym, I used to leave the house every day and walk, and I stopped doing that.”; 52Y; BMI=26.8	.127	<b>.244</b>	.100	.052	.131	6 (9)	19.4
<b>Environmental factors</b>									
Interpersonal environment	Weight gain was attributed to interpersonal environment factors (e.g., family dynamic).	“Maybe it was the [romantic] relationship that influenced the weight”; 56Y; BMI=26.2	.208	.001	<b>.238</b>	.042	.122	4 (6)	12.9
Pandemic	Weight gain was attributed to the pandemic situation and its consequences (e.g., home confinement).	“During this phase of the pandemic, I also believe it played a role in contributing to that [weight gain]”; 63Y; BMI=27.2	<b>.433</b>	.005	.002	.008	.112	12 (22)	38.7
Professional life characteristics	Weight gain was attributed to characteristics of one's professional life (e.g., work schedules).	“I used to lead a very sedentary [professional] life, spending most of my day sitting in a chair”; 59Y; BMI=26.5	.029	.023	.037	<b>.210</b>	.075	9 (18)	29
Stressful life events	Weight gain was attributed to stressful life events (e.g., a divorce).	“Since my mother's passing, it was blatant [the weight gain], completely.”; 53Y; BMI=32.3	.271	<b>.369</b>	.057	.098	.199	11 (22)	35.5
Eigenvalue			2.983	2.581	2.272	2.026	2.466	—	—
Inertia			.142	.123	.108	.096	.117	—	—
% Variance			14.205	12.291	10.817	9.650	11.741	—	—
Cronbach's Alpha			.698	.643	.588	.532	—	—	—

**Note.** Dimension 1 = Emotional eating/ Cravings, Physical inactivity, and Pandemic effects; Dimension 2 = Health, Lack of self-care, and Stressful life events; Dimension 3 = Biological/Physiological factors, Binge eating, and Interpersonal influences; Dimension 4 = Changing habits and routines, and Work Environment; *n\** = participants who mentioned the sub-category, considering the total sample (*n*=31); *N\*\** = total number of times the sub-category was mentioned; %\*\*\* = percentage of participants who mentioned the sub-category; Y= Years (age); BMI= Body Mass Index (kg/m<sup>2</sup>); The bold values indicate the most significant factorial weights for each variable, obtained through Multiple Correspondence Analysis.

### DISCUSSION

Considering the prevalent issue of obesity in menopausal women and the resulting consequences, often linked to weight gain during the menopausal transition, this study aimed to explore the influential factors of weight gain in a sample of Portuguese post-menopausal women. Utilizing a mixed-methods approach, the study revealed a comprehensive four-dimensional model to understand these factors.

The first dimension - Emotional eating/Cravings, Physical inactivity, and Pandemic effects, highlights the significant roles of specific behavioural and environmental factors in contributing to weight gain during the menopausal transition. Specifically, food cravings, emotional eating, physical inactivity, and the influence of the pandemic were highlighted. In this phase of a woman's life, anxiety and depression, in addition to weight gain, are common concerns (Sociedade Portuguesa Ginecologia [SPG], 2018), and various life situations (e.g., children leaving home, divorce) can impact emotional well-being (Bondarev et al., 2020). A recent systematic review of the diverse interpretations of menopause found that approximately one-third of women believe that divorce rates may increase during menopause (Shamsalizadeh et al., 2023). Emotional eating and/or cravings for specific types of food are common responses to emotional and physiological challenges (Burnatowska et al., 2023). Additionally, the emotional distress associated with the pandemic has further disrupted eating patterns, leading to increased cravings and consumption of junk food (Coppi et al., 2021). As a result, the later study found that more than half of women experienced weight gain.

Multiple studies have consistently shown a strong connection between physical inactivity and weight gain in women going through this life stage (Al-Safi & Polotsky, 2015; Bondarev et al., 2020; da Silva et al., 2018; Kapoort et al., 2017; Pimenta et al., 2014). In particular, da Silva and colleagues (2018) have demonstrated that physical inactivity more than doubles the likelihood of weight gain in menopausal women and is linked to a prolonged period of obesity. Additionally, it is crucial to note that a sedentary lifestyle can have detrimental effects on the emotional well-being of these women, and physical activity plays a crucial role in enhancing life satisfaction and overall well-being (Bondarev et al., 2020). This interaction of physical inactivity, emotional eating, and food cravings can result in a cycle that predicts weight gain or weight recovery. This combination can negatively impact mental health, potentially contributing to a vicious cycle (Kapoor et al., 2017).

The second dimension - Health, Lack of self-care, and Stressful life events, unveils the contribution of various physical/biological factors (such as health problems and steady weight gain), behavioural factors (including a lack of self-care, increased frequency of eating, and reduced physical activity due to the pandemic), and environmental factors (like stressful life events) to weight gain during this phase. Some of these findings align with previous studies (Pimenta et al., 2014). Menopause is a significant phase in a woman's life, often accompanied by a range of symptoms (e.g., hot flashes) and health issues (e.g., muscle pain). However, many women tend to ignore these symptoms or delay seeking appropriate medical advice, often due to a lack of self-care, which can result in a decreased quality of life (Simbar et al., 2023). This lack of self-care can be linked to insufficient health and menopause-related information, as well as certain life events (e.g., the "empty nest", the onset of chronic family or personal illnesses, the loss of family and friends), where women may prioritize the needs of others over their own (Atrian et al., 2018; Bondarev et al., 2020). It is worth noting that another study identifies a shift towards self-care behaviours in post-menopausal women, with increased attention to nutrition, exercise, and weight control (Simbar et al., 2023). However, approximately half of the women may not adopt these self-care practices (Simbar et al., 2023). Another noteworthy finding in this dimension pertains to an increase in the frequency of eating during the day, particularly snacks. A study conducted by França et al. (2021) revealed an association

between an increased frequency of meals per day and the inclusion of a mid-afternoon snack, leading to a lower BMI. It is important to note that these meals were characterized by a dietary pattern rich in fruits and vegetables (França et al., 2021). The present study highlights a higher meal frequency, though it lacks specific information regarding the nature of these meals. The relationship between meal frequency and its impact on obesity warrants further investigation, though the idea that a higher number of meals may be associated with health benefits, such as managing diabetes, appears to be a consistent finding among studies (França et al., 2021; St-Onge et al., 2017). Moreover, during the pandemic, these behaviours (i.e., eating more frequently), as well as reduced physical activity, were notably prevalent (Coppi et al., 2021).

The third dimension – Biological/Physiological factors, Binge eating, and Interpersonal influences, reveals that some biological factors (such as medication intake, menopause and its related symptoms, and metabolic factors and/or genetic predisposition), behavioural factors (unhealthy eating, binge eating, and greater pleasure in eating), and environmental factors (interpersonal environment) contribute to weight gain during this phase. Biological factors (e.g., increased insulin resistance, aging, medication intake) are well-documented contributors to weight gain, as supported by previous research, and can exert a significant impact on a woman's ability to maintain a healthy weight during this phase (Kapoor et al., 2017; Monteleone et al., 2018). Furthermore, the role of behavioural factors is also evident and interconnected. A recent study suggests that addictive processes may contribute to binge eating in women (Levallius et al., 2022). These processes of addictive eating can be understood from two perspectives: the involvement of reward systems associated with appetitive motivation (biological processes) and the decision-making systems that control food intake choices (behavioural processes; Burnatowska et al., 2023; Ho & Verdejo-Garcia, 2021; Levallius et al., 2022). Moreover, this dimension underscores the impact of the interpersonal environment. Environments that encourage unhealthy eating can significantly influence food choices, as can binge eating (Ho & Verdejo-Garcia, 2021). Additionally, the presence of emotional support from spouses can be crucial, particularly in reducing depressive and anxiety symptoms and aiding women in adapting to the menopausal process (Namazi et al., 2019). As a result, women can have a better quality of life and, consequently, are more likely to adopt healthier behaviours. Previous research on menopausal women has explored traditional eating patterns, which include a mixture of healthy and processed foods, and has associated them with a higher BMI (França et al., 2021). This emphasizes the need to consider dietary habits and their impact within the context of menopausal weight management.

The fourth dimension – Changing habits and routines, and Work Environment, highlights that certain behavioral factors (smoking cessation, increased appetite and higher food intake, and lack of daily routines) and environmental factors (professional life characteristics) contribute to weight gain during this phase. Smoking cessation is highlighted as a significant factor in an increase in appetite and weight (da Silva et al., 2018). These authors suggest that when individuals quit smoking, it can lead to an increase in appetite, which, in turn, may result in higher calorie intake. Furthermore, additional research highlights that heightened appetite and increased calorie intake are prevalent during this phase and may also be related to physiological processes (Ali et al., 2020). Compounded with all these menopausal challenges, women often face the perception that their professional commitments leave them with limited time for their personal lives, which is associated with higher stress levels and fatigue (Pinto et al., 2018). The increased stress/fatigue and lack of daily routines (e.g., lack of time and organization to prepare meals, a loss of ability to maintain routines) can contribute to a greater likelihood of consuming more food (Ali et al., 2020; Pinto et al., 2018).

The findings of this study are consistent with the conceptual model of Triadic Reciprocal Determinism (TRD), a component of Bandura's social cognitive theory. TRD highlights the dynamic interaction among personal, behavioural, and environmental factors that shape behaviour (Lo Schiavo

et al., 2018). Our four-dimensional model aligns with this framework, illustrating how these three factors interplay across most dimensions. It is worth noting that the factors may not hold the same level of significance within TRD and might change over time (Lo Schiavo et al., 2018).

While this study provides a comprehensive exploration of menopausal weight gain through a mixed methods approach, several limitations warrant consideration. Firstly, despite being a qualitative study, the sample size is relatively small. Conducting online/telephone interviews may have influenced some results, as some women might not feel as comfortable discussing specific topics remotely. Moreover, the preference for telephone interviews over Zoom might have influenced some responses, as Zoom offers more direct contact and interaction due to its video component. Nevertheless, the flexibility in allowing participants to select their preferred interview method resulted in increased participation rates, preventing dropouts arising from potential discomfort or unfamiliarity with Zoom, despite the researcher's provided assistance. Thirdly, conducting the study during the pandemic introduced temporal factors (e.g., lockdowns, health concerns) that could have influenced participants' responses. The MCA analysis revealed alpha values below the 0.7 threshold. Nevertheless, this is somewhat acceptable in exploratory studies with limited sample sizes (Johnson and Wichern 2007). This quantitative shortcoming may, to some extent, be offset by the richer context provided by the qualitative data. It is worth noting that although two team members conducted the coding process, interrater reliability was not formally assessed. Future research could use larger sample sizes, employ alternative theoretical frameworks (e.g., the common-sense model), and explore the role of romantic partners during menopause.

In conclusion, this study delves deep into menopausal transition-related weight gain, offering a four-factor model aligned with Bandura's Triadic Reciprocal Determinism. Tailored interventions for postmenopausal women and preventive measures for premenopausal women are needed.

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