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Isolated Appetites: Unveiling the Relationship between Social Isolation and Food Preferences among the Portuguese Population Aged 65+

Dissertation submitted to the Catholic University of Portugal to obtain a master's degree in Psychology

- Specialization in Clinical and Health Psychology -

Work carried out under the guidance of

Professor Patrícia Oliveira-Silva

Professor Diana Cristina Rodrigues Pereira

Jessyca Qiu

Porto, September 2024

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- Especialização em Psicologia Clínica e da Saúde -

Jessyca Qiu

Trabalho efetuado sob a orientação de

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List of Abbreviations:

FCQ – Food Choice Questionnaire

HBM – Health Belief Model

SI – Social Isolation

SIS – Social Isolation Scale

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Abstract

This dissertation investigates the association between food choice and social isolation in older individuals with 65 years old and above. More specifically, we seek to investigate whether greater social isolation may lead to specific food choices in the older population individuals. A structured survey including social-demographic information, social isolation and food choice preferences were answered by 59 participants (55.9% females), aged between 65 and 87 years, from the north region of Portugal. The results did not support our assumption on the possible association between food choice and social isolation. We discuss that several obstacles may have led to such a result, such as the sample size, the measuring instrument which might not be suitable for the targeted population, as well as the recruitment process which might generate unconscious recruitment bias. Given this conclusion, more research is needed in exploring the effects of social isolation in one's food selections in our aging societies.

Keywords: aging, older adults, social isolation, food choices

1. Introduction

Recent worldwide projections suggest that, by 2050, 22% of the world's population will be aged 60 or more (World Health Organization, 2022). The fast-growing older population is reshaping the demographic globally, bringing to the forefront multiple public health challenges. One such pressing issue, particularly in Portugal, is the impact of social isolation on the dietary preferences of the older population. This research seeks to explore the complexities of how social isolation associates with dietary habits and choices among Portuguese adults aged 65 or above. With an ageing population that is growing at a significant rate, with data from national statistics showing that people aged 65 or more represent 23.4% of the resident population (Instituto Nacional de Estatística, 2017), understanding these dynamics becomes crucial for health policy and aged care. The primary aim of this study is to investigate the relationship between social isolation and dietary preferences and habits among the older population in Portugal. It seeks to identify possible patterns and implications of isolation on food choices, contributing to better-informed health and social policies designed to the needs of this demographic group.

Social isolation is recognized as a critical determinant of health, influencing a wide array of health outcomes including nutrition, mental health, and overall mortality rates (Holt-Lunstad et al., 2015). Its prevalence and impact among the older population are of particular concern, given the susceptibility of this demographic to both social isolation and nutritional deficiencies (Matos et al., 2021; Nicholson, 2012; Roy et al., 2023). In Portugal, a country characterised by its unique socioeconomic and health-related attributes among the older population, with estimates suggesting that 20% of the Portuguese population aged 65 or more lives alone (Low et al., 2024), the exploration of this relationship is not only pertinent but also timely.

The implications of this study are manifold. On a societal level, understanding how social isolation is associated with dietary choices can guide the creation of targeted interventions to improve the nutritional status and overall health of the older population. On a public health level, it can inform policies and programs aimed at reducing social isolation and its adverse effects among the ageing population. Therefore, this research not only addresses a significant gap in the academic literature but also responds to an urgent public health need.

In sum, this dissertation seeks to provide a comprehensive analysis of the relationship between social isolation and dietary preferences among older individuals Portuguese adults. Through a meticulous review of the literature and empirical investigation, it aims to offer

insights that will aid in the formulation of more effective health and social policies targeted at the ageing population in Portugal.

2. Literature Review

The world is experiencing significant demographic changes, with an increase in the proportion of older adults. As noted by the National Institute on Ageing (2019), the global population of people aged 65 years and over is growing faster than all other age groups, leading to societal shifts and new challenges in healthcare, pension systems, and family dynamics. Portugal, like many European countries, is no exception. The percentage of the population over 65 has been steadily rising in Portugal (World Health Organization, 2022) posing challenges to the healthcare system and social services. Examples are higher rates of chronic disease, limited access to care, and increase levels of loneliness and social isolation (Santos-Eggimann et al., 2009).

The various health challenges associated with ageing include increased susceptibility to chronic diseases, mobility issues, and mental health conditions like depression and loneliness (Ebeling et al., 2021; Institute of Health Metrics and Evaluation, 2023; McGregor et al., 2014; United Nations Department of Economic and Social Affairs, 2022). These health issues are often exacerbated by social isolation, which can also affect the dietary habits and nutritional intake of the older individuals (Acierno et al., 2010).

More specifically, social isolation is characterised by an objective restriction to one´s a lack of social contacts and meaningful relationships (Taylor et al., 2023). It is estimated that one in four community-dwelling older adults report being socially isolated (Teo et al., 2023). In Portugal, the available prevalence data indicate that around 14.9% of older adults report being lonely (Surkalim et al., 2022). In a study by Mota-Pinto et al., 2011, the results indicated that a significant number of middle-aged and older Portuguese individuals, almost 1/3, were unmarried and spent eight or more hours per day alone, and about 1/5 lived alone, which are factors contributing to social isolation. The study also revealed that being older, female, and residing in a rural area were associated with worse outcomes in terms of social isolation, illiteracy, and undifferentiated occupation. Moreover, the analysis, showed that 34% of the individuals spent eight or more hours per day alone, with this figure being higher among older women. The study identified female gender, unmarried marital status, and living alone as significant variables associated with social isolation.

Social isolation has been associated with various negative health outcomes, including poor mental and physical health, particularly among the older adults (Hawkley & Cacioppo, 2010). Also, isolation can lead to changes in eating habits and preferences, often resulting in undernutrition or malnutrition among older adults (Locher et al., 2005). The lack of social interaction can diminish meal enjoyment and disrupt regular eating patterns, leading to a decrease in food intake and diversity (Vozoris & Tarasuk, 2003). From a "successful ageing" standpoint, engaging in meaningful activities and maintaining social ties are crucial for the well-being of older individuals (Havighurst, 1961). Accordingly, social isolation can be seen as a significant barrier to successful ageing, potentially leading to decreased motivation for self-care and nutrition. As social interaction decrease, so might the occasions for social eating and sharing meals, which are not only nutritionally beneficial but also provide emotional and social sustenance. The narrowing down of social contacts may lead to a reduced variety of food experiences and diminished interest in eating, particularly if food has historically been a mean of social connection and pleasure. Moreover, social isolation can lead to feelings of loneliness, depression, and anxiety, which are known to affect eating behaviours (Prizeman et al., 2023; Zhang et al., 2024). Strine et al. (2008) have documented the prevalence of depression and anxiety in the general population, highlighting the importance of considering these factors in health behaviours. In the context of older adults, these psychological factors can lead to changes in appetite and food preferences, potentially resulting in malnutrition or an overreliance on comfort foods.

This relationship between social isolation, food preferences and dietary habits in older adults can be informed by additional theoretical frameworks. For example, according to Rosenstock (1974) Health Belief Model (HBM), health-related action depends upon the simultaneous occurrence of three classes of factors: the individual's perception of a threat posed by a health problem (perceived severity and susceptibility), the perception of the benefits of avoiding that threat, and the berries to taking the recommended action. In the scenario of isolated older individuals, the perceived severity and susceptibility to dietary-related health issues might diminish due to a lack of social feedback and health information exchange, reducing the motivation to maintain a healthy diet. Furthermore, if isolation leads to perceived barriers such as decreased access to fresh groceries or lack of skills and motivation to prepare meals, the likelihood of engaging in poor eating habits increases.

The lenses of stress, coping mechanisms, and behaviour change theories are also useful to understand social isolation and food choices. Following the Richard S. Lazarus and Susan Folkman (1984) theory of stress, appraisal, and coping, individuals appraise the stressful

situation (in this case, social isolation) and engage in coping strategies to manage the perceived stress. The lack of social interaction and support can lead to maladaptive coping mechanisms, such as emotional eating or reduced motivation to prepare balanced meals, this maladaptive coping can result in detrimental changes in food preferences and nutritional intake, impacting the individual's overall health and well-being.

Furthermore, the role of food as an emotional regulation strategy becomes crucial in the context of social isolation. According to Spence (2017), many individuals, including older individuals, might develop a preference for foods that provide immediate emotional associated with these foods. Comfort foods often have a high calorie content and are typically linked to childhood or home cooking, carrying a nostalgic or sentimental appeal, thereby priming positive thoughts of previous social integrations and alleviating loneliness, especially among those who are securely attached. The consumption of comfort foods tends to be a common response to negative emotions or to regulate emotional state, highlighting their role in emotional and sensory satisfaction.

This shift in food preferences could also be attributed to the brain's response to social isolation, involving increased activity in neural pathways associated with social pain, like those activated by physical pain (Eisenberger, 2012). Such neural responses might trigger coping mechanisms, including altered food preferences, as the individual seeks comfort or distraction from feelings of loneliness. Relatedly, Tomova et al. (2020) pinpointed that the brain's reward system, which is activated during positive social interactions, may seek reward and pleasure from other sources, such as food, in the absence of social interactions. These authors suggest that acute isolation can cause cravings for social interaction, like how fasting causes hunger, and these cravings may extend to food as a substitute for social fulfilment. The dietary choices made in response to social isolation could reflect a combination of seeking sensory pleasure and attempting to mitigate the emotional distress caused by loneliness.

Baltes (1993) theory on the ageing mind also discusses the role of selective optimization with compensation as a strategy used by individuals to adapt to the changes and losses that accompany ageing. This perspective is particularly relevant when considering the physical and cognitive changes that might affect dietary habits, such as decreased sensory abilities (e.g., Whitelock & Ensaff, 2018). As individuals age, they might need to adapt their food preferences and eating habits to accommodate these changes. However, social isolation can complicate this adaptation process, as it may limit access to a variety of nutritious food, or the support needed to make necessary dietary adjustments.

Taken together, it seems that the absence of a supportive social network can leave individuals turning to food as a readily accessible source of comfort and pleasure, influencing their dietary habits and overall well-being (Cacioppo et al., 2014; Shlisky et al., 2017). Considering that older adults are particularly susceptible to social isolation due to an interaction of sociodemographic (e.g., lower income), psychosocial (e.g., relationship losses and late life transitions) and health-related factors (e.g., presence and worsening of chronic health issues), understanding the relationship between social isolation and food preferences is of utmost importance in this population, especially in connects characterized by high ageing and social isolation rates such as Portugal.

Furthermore, and as suggested by Rozin (2005), the emotional and symbolic meaning of food can vary significantly across different cultures. For many, food is deeply intertwined with social relationships and emotional well-being. In the Portuguese context, where communal meals and family gatherings often centre around food, the experience of eating extends beyond nutritional intake to include social pleasure and emotional fulfilment. As individuals become more isolated, they may miss out on these critical social and emotional aspects of eating, which can lead to diminished appetite, a turn towards comfort foods that might not be nutritionally adequate and, importantly for the current research, altered food preferences. In this context, the current dissertation intents to contribute to this topic by exploring the association between food choices and social isolation in a sample of community-dwelling Portuguese older adults.

3. Method

3.1. Methodological Justification

This study employs a quantitative research approach to explore the relationship between social isolation and food preferences among old adults a community-dwelling sample recruited in Porto, Portugal. The quantitative methodology was selected as it allows for a precise measurement of the degree of social isolation and the specific food preferences of individuals, facilitating the examination of patterns and relationships between variables.

3.2. Participants

The study utilises a non-probabilistic, convenience sample of 59 participants (55.9% females), aged between 65 and 87 years (M = 69.68, SD = 5.14), residing in Porto (Portugal). Participants were recruited from local senior universities, shopping malls, cafes, and parks, ensuring a sample that was engaged and accessible. To be included in the study, participants had to be aged 65 or above. They should be able to autonomously respond to survey questions and report the lack of severe cognitive impairment that could impair understanding or consent. Note that during the collection stage, a relatively significant rate of refusal was encountered by the data collector. Informed consent was obtained from all participants after they were fully briefed about the study's purpose, procedures, risks, and benefits.

3.3. Materials

Quantitative data were collected using the following instruments:

3.3.1. Socio-Demographic Questionnaire

A sociodemographic questionnaire was designed to collect comprehensive socio-demographic information, including age, gender, living areas, marital status, and health status, which might influence or correlate with the primary variables of interest.

3.3.2. Social Isolation Scale

The Social Isolation Scale (SIS) was developed by Nicholson (2009) for assessing social isolation (SI) among older adults aged 65 years and above. An adaptation for the Portuguese older adult's population by Tavares et al. (2023) was used in the current study. This scale provides a reliable measure of the various dimensions of social isolation, and it comprises two dimensions: (i) Objective Connectedness - this dimension includes three items that inquire about the frequency of the participant's contact with family, friends, and neighbours. Respondents indicate these frequencies on a Likert scale ranging from 0 (no contact) to 6 or more times. (ii) Subjective Belongingness - this dimension also consists of three items but focuses on the participants' perceived quality of relationships and engagement in social activities. The questions probe the sense of fulfilment, belonging, and time spent on social activities, with responses ranging from "strongly disagree" to "strongly agree" on a Likert scale.

It has demonstrated good internal consistency and an excellent factor model fit in its original version (Cronbach's alpha = 0.77, CFI = 0.997, and RMSEA = 0.038). The Portuguese

version of the scale was adapted, and content validated by Tavares et al. (2023), showing a content validity index of 0.89 and modified kappa values ranging from 0.89 to 1, indicating excellent agreement.

The scoring procedure of SIS requires dividing the questions into two sections (section 1, section 2), both sections include 3 questions. All answers correspond to certain points (Section 1: 0 = 1 point, 1 = 2 points, 2-3 = 3 points, 4-5 = 5 points, 6/+ = 5 points; Section 2: Totally Disagree = 1 point, Partially Disagree = 2 points, Don't Agree/ Disagree = 3 points, Partially Agree = 5 points, Totally Agree = 5 points; inverse direction on Section 2 question b). By adding up the corresponding points, a total score for each section can be calculated. Through adding up scores from section 1 and section 2, a total score can also be obtained. The SIS is designed such that lower scores indicate higher levels of social isolation. Specifically, a total score of 9 or beneath indicates social isolation, 10 to 15 corresponds to risk of social isolation, 16 or more indicates no risk of social isolation.

3.3.3. Evaluation of Food Choices

Adapted from the original framework by Steptoe et al. (1995), the Food Choice Questionnaire (FCQ) assesses the underlying motives influencing food choices. This questionnaire is structured to explore how various factors such as health, mood, convenience, and sensory appeal among others dictate food preferences.

The following dimensions are included in the FCQ: (i) The health dimension assesses the importance of food being healthy and nutritious. Participants rate how much they value food that keeps them healthy, contains a lot of vitamins and minerals, is high in protein, and fibres. (ii) The mood dimension explores the impact of food on emotional state. It includes considerations such as food's ability to improve mood, provide comfort, help cope with stress, and contribute to a feeling of happiness or satisfaction. (iii) Convenience aspect focuses on how the ease of preparation and availability influence food choices. It addresses the importance of foods that are quick to prepare, easily accessible, require minimal cooking, and can be bought in shops close to where people live or work. (iv) Sensory appeal pertains to the taste, texture, smell, and appearance of food. It evaluates how much these sensory properties affects food choices, emphasizing the enjoyment derived from eating. (v) Natural content dimension measures the preference for foods that are free from additives and artificial ingredients and perceived as being more 'natural'. This factor is significant for individuals who prioritize clean eating and are concerned about food processing. (vi) Price assesses the role of cost in food choice. It involves considerations of food being affordable, good value for money, or

inexpensive. (vii) Weight control aspect deals with the importance of choosing foods that help maintain or achieve a desired body weight. It includes preferences for low-calorie, low-fat foods that aid in weight management. (viii) Familiarity relates to the preference for foods that individuals are accustomed to, including traditional dishes or foods consumed during childhood. (ix) Lastly, ethical concerns cover the importance of the ethical aspects of food production and consumption. It includes considerations such as environmental impact of food production, country of origin.

Each response is quantified on the Likert scale, ranging from not at all important to very important. The FCQ addresses a wide range of food items and dietary aspects, from prices to more specific dietary components like fibre, proteins, and natural ingredients. The questionnaire is adapted to include foods and dietary habits specific to the Portuguese population, enhancing its relevance and accuracy in capturing dietary patterns.

The scoring procedure is based on the nine dimensions: health (Q1 - Q5), mood (Q6 - Q12), convenience (Q13 - Q17), sensory appeal (Q18 - Q21), natural content (Q22 - Q24), price (Q25 - Q27), weight control (Q28 - Q30), familiarity (Q31 - Q33), ethical concerns (Q34 - Q36). The Likert scale corresponds to different scores (Not at all important = 1, Little bit important = 2, Moderately important = 3, Very important = 4, Extremely important = 5). A mean dimension score can be calculated, allowing to order dimensions from the most important to the least important.

3.4. Data Collection Procedures

The data collection was systematically conducted as follows: (i) Respondent identification: participants were selected based on the age criterion and their capacity to respond autonomously to the questionnaires. (ii) Informed consent: detailed information about the study was provided to potential participants, ensuring they understood their involvement and rights. Informed consent was obtained from each participant. (iii) Instrument administration in the following order: socio-demographic questionnaire, SIS, FCQ. The questionnaires were administered in a quiet and private setting to ensure that participants could respond without disturbance.

3.5. Data Processing Procedures

Data was processed using IBM Statistical Package for Social Sciences (SPSS) v.29.0.2.0. Descriptive statistics were used to understand the sample characteristics. For

inferential statistics, a non-parametrical test of spearman correlation coefficient (ρ) was used to understand the association between social isolation and food choices analyses (Aldrich & Cunningham, 2016). Thus, the total scores of the instruments were analyzed. For statistical correlations, it was considered that the value of .30 corresponds to a weak correlation, .50 represents a moderate correlation and .70 a strong correlation and, by convention, results with $p < .05$ were considered statistically significant (Rumsey, 2011).

3.6. Ethical Considerations

Ethical considerations were paramount throughout the research process. Approval was obtained from an institutional review board, and all participants provided informed consent, understanding the purpose of the study and their rights. Confidentiality and anonymity of the data were ensured, and participants were informed that they could withdraw from the study at any point without any negative consequences.

4. Results

4.1. Descriptive Data

The mean age of participants was approximately 69.68 ($SD = 5.14$) years. This indicates a relatively younger senior population, which is consistent with the median age of 68 years. The age distribution was slightly skewed towards younger seniors. In terms of gender distribution, the sample had a slight female predominance (55.9%). The marital status of the participants indicates a high proportion of marital stability, with 71.2% being married, 13.6% divorced, 8.5% widowed, and 6.8% single. Educational attainment among the participants varied, with the largest segment, 40.7%, having completed the third cycle of basic education, equivalent to the 9th grade. Secondary education was completed by 20.3% of the sample, and a smaller fraction, 8.5%, holds a bachelor's degree. The living environments was predominantly moderately urban (71.2%), with fewer living in predominantly urban (20.3%) or rural (5.1%) settings. Regarding economic conditions, 44.1% of the participants reported that their income allowed them to live comfortably, whereas 50.8% just manage to meet their needs. A very small proportion, 1.7%, expressed difficulty in managing on their current income. Regarding health behaviours and conditions, the results revealed that only 13.6% of the sample were smokers. Also, chronic health issues (e.g., diabetes, hypertensions) were reported by 57.6% of

the participants. A summary of the descriptive statistics of the SIS and FCQ scores can be found in Table 1.

Table 1

Descriptive Statistics of the SIS and FCQ Scores

	Range	Mean (*SD*)	Skewness	Kurtosis
Health	2.83	4.06 (0.82)	-0.69	-0.45
Mood	4.00	3.37 (1.27)	-0.16	-1.29
Convenience	4.00	3.95 (1.09)	-0.63	-0.71
Sensory Appeal	4.00	4.16 (0.89)	-1.22	1.50
Natural Content	4.00	4.25 (1.08)	-1.27	0.48
Price	4.00	4.28 (1.19)	-1.65	1.79
Weight Control	4.00	3.86 (1.19)	-0.88	-0.29
Familiarity	4.00	3.49 (1.10)	-0.28	-0.68
Ethical Concerns	4.00	2.85 (1.32)	0.24	-1.10
Total Social Isolation Score	18.00	24.02 (3.53)	-1.10	2.29

Note. FCQ = Food Choice Questionnaire; SIS = Social Isolation Scale.

With respect to social isolation, the categorization provided by the SIS was used to understand the distribution of social isolation levels within our sample of 59 participants. Three categories are available: 1 representing “social isolation”, 2 indicating “risk of social isolation”, and 3 denoting “no risk of social isolation”. The final score of the SIS, had the mean of 24.02, given that scores over 16 would be considered as no risk of social isolations. This suggest that the majority of the sample falls into the “no risk of social isolation” category. The consistency across these measures of central tendency indicates a skewed distribution towards lower risk. The standard deviation of the variable is relatively low at 0.18, implying little variability in the responses. The skewness of -5.29 is highly negative, indicating a distribution heavily skewed towards the higher end of the scale. This is consistent with the observed central tendency values, confirming that most respondents are categorized as having “no risk of social isolation”. Kurtosis is significantly high at 26.86, suggesting an extremely peaked distribution. This extreme kurtosis value reflects the concentration of responses in a specific category, further verified by the high frequency of the mode.

Taken together the data indicates that the sample is predominantly characterized by individuals at “no risk of social isolation”, with the central tendency values converging around the category 3. The extremely high kurtosis and significant negative skewness shows the limited diversity in the responses, with most participants falling into the same category,

suggesting a very homogenous sample concerning social connectivity. This pattern suggests that issues related to social isolation may be minimal among the surveyed sample.

In the case of food choice, it was observed that price was the most critical factor influencing food choices among the respondents, reflecting the high average importance rating (M = 4.28, SD = 1.19). This indicates that cost considerations were paramount. Natural content emerges as the second most significant factor (M = 4.25, SD = 1.08), with respondents highly valuing foods that are perceived as natural or containing fewer artificial ingredients. The third most important factor, sensory appeal (M = 4.16, SD = 0.89), includes taste, texture, flavour, and visual appeal of food, suggesting that the sensory experience is a critical determinant in food selection. Health consideration ranked fourth (M = 4.06, SD = 0.82), indicating a strong awareness and concern for the health impacts of foods consumed. After it follows the convenience factor (M = 3.92, SD = 1.09), essential in contexts requiring quick meal solutions or ease of preparation. Concerns about weight control were moderately significant (M = 3.86, SD = 1.19), reflecting a conscious effort among consumers to select foods that support weight management goals. Familiarity with food ranks seventh (M = 3.49, SD = 1.10), indicating a moderate preference for well-known and tried products. Foods that influence mood are considered important but less so than other factors (M = 3.36, SD = 1.27). Ethical concerns receive the lowest importance rating (M = 2.85, SD = 1.32).

The rankings reveal that economic, practical, and sensory attributes of food take precedence over health, familiarity, mood enhancement, and ethical considerations. This prioritization reflects a multifaceted approach to food selection, where immediate tangible benefits, such as cost-effectiveness, natural ingredients, and pleasurable eating experiences, outweigh more abstract benefits like mood enhancement and ethical considerations.

4.2. Association Between Social Isolation and Food Choices

After testing for the normality distribution of the scores obtained from the questionnaires. It was confirmed that the normality was violated. Accordingly, we use the non-parametric test of spearman to test the association between variables. The correlation coefficients are presented in Table 2.

Table 2

Correlations Between SIS Total Score and Mean Scores of Each FCQ Dimension

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. SIS - Total Score	1	.10	<.01	-.18	-.14	<.01	-.04	-.13	<.01	-.15
2. FCQ - Health		1	.31	-.09	.07	.51**	.28*	.39**	.21	.33
3. FCQ - Mood			1	-.18	.52**	.08	.12	-.08	.22	.36*
4. FCQ - Convenience				1	.10	-.13	.09	.06	.08	.02
5. FCQ - Sensory Appeal					1	.04	.26	.08	<.01	.28*
6. FCQ - Natural Content						1	.38**	.34**	.16	.31*
7. FCQ – Price							1	.02	.13	.12
8. FCQ - Weight Control								1	.10	.16
9. FCQ - Familiarity									1	.30*
10. FCQ - Ethical Concerns										1

Note. FCQ = Food Choice Questionnaire; SIS = Social Isolation Scale.

*$p < .05$. ** $p < .001$.

The correlation between total social isolation and all other factors extracted from the FCQ were very weak and not statistically significant (see Table 2). Thus, the analysis suggested that social isolation does not associate with any of the food choices variables studied in the current sample of participants.

5. Discussion

Our study aimed to explore the association between food choice and social isolation among individuals aged 65 and above, being motivated by the paucity of studies focusing on

the relationship between there variables among older adults, particularly in the Portuguese context. Even though there is substantial evidence calling our attention to the importance of studying the global phenomenon of ageing and isolation (see Holt-Lunstad et al., 2015; National Academies of Sciences, 2020), there is also the need for a more comprehensive, culturally sensitive research that addresses the psychological mechanisms linking social isolation to changes in food preferences. For this purpose, we have recruited 59 community-dwelling Portuguese older adults (aged 65 or more) and invited them to complete two self-report measures, one focused on social isolation and other on food choices. Despite substantial evidence linking social isolation to various adverse health outcomes, including poor nutrition (e.g., Saif et al., 2023), the current study revealed no statistically significant correlation between these variables.

Prior studies have indicated possible relationships between food and social isolation across multiple countries in Europe (Matos et al., 2021; Hanna et al., 2023; Kalousova, 2014; Low et al., 2024; Whitelock & Ensaff, 2018). Even though there is no association between variables detected in this study, one interesting observation might be extracted from the order of FCQ. According to Markovina et al. (2015), the Portuguese population rated "price" as the most important dimension, followed by "sensory appeal", "natural content", "health", "weight control", "convenience", "mood", "ethical concerns", with "familiarity" being rated as the least important dimension. Comparing these results to the current study, some similarities were able to be found. For the current study, "price" was considered as the primary importance just like in Markovina et al. (2015), followed by "natural content", "sensory appeal", "health", "convenience", "weight control", "familiarity", "mood", lastly being the "ethical concern". Thus, a great similarity was observed in both studies, indicating a cultural consistency in the Portuguese population, such as the importance of price and sensory appeal, which might universally influence the dietary decisions cross different populations, regardless of specific groups. Another possible interpretation would be the validation, generalization, and robustness of the FCQ.

Nonetheless, the lack of a statistically significant result in our study may be due to various reasons. Some possibilities might be the small sample size, the selection bias in the sample recruitment process, and the lack of variability regarding the self-reported experience of social isolation. This last point seems to be particularly relevant as there seems to be a notable bias in gerontological research, where participants are often those that are at less risk of social isolation, thus leading to an underrepresentation of results (Grenade et al., 2008; Thompson et al., 1994). Also, the lack of association might indicate that the emotional or social

aspects of isolation are not being expressed or managed through food-related behaviors in our sample as assessed by the FCQ. This notion could be relevant for interventions aimed at addressing social isolation, suggesting that other areas besides food choice might be more effective targets for improving social integration and mental health.

Even though we have planned to recruit community-dwelling older adults, we cannot overlook the fact that we are dealing with a vulnerable group and that social isolation remains a stigmatized issue: "Individuals experiencing isolation may feel embarrassed or uncomfortable acknowledging their isolation to others, and it is possible that individuals might experience stigma after being labeled as "lonely" by a health care provider." (National Academies of Sciences, 2020). This is why conventional self-report measures of social isolation tend to not include overt items about isolation to circumvent the possible stigma and consequent underreporting of these experiences. Thus, these conditions may have somehow contributed to the current pattern of findings.

5.1. Limitations and Future Directions

As mentioned earlier, our sample was biased towards participants that are not at risk of social isolation and the recruitment strategies might be an important player. Enhancing recruitment strategies could involve more targeted outreach that accommodates the unique conditions of this demographic to ensure a more representative sample. Literature suggests that innovative recruitment strategies, including the use of local community networks and engaging trust local figures, can increase participation rates among older adults, ensuring a more diverse sample (Dibartolo & McCrone, 2003; Duberstein et al., 2004). This approach is particularly relevant in rural or underserved areas, where traditional recruitment strategies may be less effective.

The lack of significant findings also raises questions about the variables and measures used. The FCQ has been validated and applied in numerous studies across various populations, affirming its reliability and cross-cultural applicability in capturing food choice motives (Markovina et al., 2015). However, its suitability for capturing the specific food choice motives of older populations may not be fully ensured, given that the instrument was originally developed and most extensively applied among broader adult age groups. The age group applied in the original study ranged from 18 to 65, whereas in the current study the age group focused on individuals with 65 years old and above.

One potential limitation when using the FCQ in research focused on older individuals is that it may not fully account for age-specific factors that significantly influence food choices

in this demographic. Research indicates that older adults may prioritize aspects of food choice differently due to factors such as changes in sensory abilities and specific health concerns that standard food choice questionnaires like the FCQ might not fully capture (Amarya et al., 2018; Boyce & Shone, 2006; Doty et al., 1984; Gaines, 2010; Imoscopi et al., 2012; Morley et al., 1989; Sinding et al., 2014; Toffanello et al., 2013; Whitelock & Ensaff, 2018). For instance, sensory declines in taste and smell are common with aging and can significantly affect food preferences and eating habits (Whitelock & Ensaff, 2018). Additionally, physiological changes related to digestion and oral health, such as difficulties in chewing and swallowing, can make ease of consumption a priority (Boland, 2016; Naik et al., 2021). It's noted that these sensory and physical changes can lead to altered dietary habit, where older adults may prefer softer foods and those that require less preparation (Whitelock & Ensaff, 2018). This highlights a gap in the FCQ's ability to probe for such preferences, which are crucial for understanding the dietary behaviors of older populations effectively.

Even though the validation of the FCQ across nine European countries showed consistent factor structures and high reliability, indicating that the questionnaire generally performs well across different populations (Markovina et al., 2015). Nevertheless, the older adults might have unique food choice drivers influenced by their specific life stage, health status, and socio-economic conditions that are not fully explored by the standard FCQ. Thus, while the FCQ is a robust tool for exploring food choice motives across diverse populations, additional research might be necessary to modify or extend the questionnaire to capture the full range of factors influencing food choices among specific populations more accurately. This could involve developing additional items or scales that focus on age-related dietary preferences or constraints, thereby enhancing the instrument's sensitivity and relevance for older adults.

Another relevant point relates to the sample size used in this study. Research consistently highlights that small sample sizes can significantly limit the statistical power of a study, which is crucial for detecting true associations between variables. Statistical power refers to the likelihood that a study will detect an effect when there is an effect to be detected (Kaplan, 2004). When the sample size is small, the study may not have sufficient power to detect small or moderate effects, leading to a failure to reject the null hypothesis when it is false (i.e., a Type II error) (Button et al., 2013). Moreover, studies with small sample sizes are more vulnerable to random errors and variability, which can further complicate the interpretation of results. This increases the risk of producing unreliable and non-replicable

findings, a significant concern in scientific research aiming for generalizable and actionable insights (Faul et al., 2009).

Additionally, small sample sizes can lead to skewed data distributions (Henderson, 2005), which was evident in the peak observed in the data distribution of this study. Such non-normal distributions can complicate analyses and lead to biased estimates (Goldstein & Spiegelhalter, 1996), especially in parametric tests that assume normality. The peaked distribution suggests a concentration of responses around certain values, possibly indicating that the sample is not adequately representative of the broader older population or that it reflects the over-representation of certain demographic or behavioral traits (Fox et al., 2021).

Lastly, although the questionnaire designed covers many relevant dimensions, but there may be other factors specifically impacting isolated older adults that were not included. For example, factors like social eating opportunities, or psychological barriers (like depression or anxiety), might also play significant roles in food choice but were not covered (Bartkiene et al., 2019; Robino et al., 2016).

For advances to continue, it would be necessary to recruit a broader sample, given the challenges associated with engaging socially isolated older individuals. Such figures might include local health workers, leaders of senior citizen centers, or respected members of religious groups, who can help bridge the trust gap and encourage participation (Dibartolo & McCrone, 2003; Ige et al., 2019; Ory et al., 2002). A larger sample size would enhance the statistical power of the study, allowing for more effective analyses of the varied experiences of social isolation among the older adults (Wilson Van Voorhis & Morgan, 2007). Furthermore, ensuring diversity in the sample—such as variations in health status, social backgrounds, and living conditions—can help in generalizing the findings more confidently across the broader older population (Levy et al., 2002; Ory, 2003; Swendeman et al., 2009).

Additionally, the development or adaptation of measurement tools specifically validated for the Portuguese older population demographic can improve data accuracy. Utilizing instruments that are culturally and contextually appropriate ensures that the complexity of social isolation in this demographic are captured more effectively.

Finally, the study could consider broader dimensions that influence social isolation, such as social settings, psychological factors, and physical accessibility. Health-related psychological barriers, such as depression and anxiety, play a significant role in social isolation and should be integrated into the study's framework (Bartkiene et al., 2019; Galef, 1996; Robino et al., 2016). Additionally, considering physical accessibility issues can provide insights into environmental and societal barriers that contribute to isolation.

6. Conclusion

This dissertation aimed to explore the relationship between social isolation and dietary preferences among older adults in Portugal, hypothesizing that social isolation would be associated with the dietary habits and choices of this demographic. However, the findings revealed no significant correlation between social isolation and the specific dimensions of food choice explored in this study, highlighting several important considerations for research methodology and the interpretation of results in gerontological studies.

The lack of significant findings underscores the complex nature of social dynamics and dietary behaviors. One critical observation was the skewed distribution of the sample towards individuals with minimal risk of social isolation, which likely impacted the study outcomes. This observation suggested that those more socially integrated were more willing or able to participate in the study, potentially biasing the results and limiting the generalizability to the entire older population. Such a distribution indicates a selection bias that might have obscured any subtle influences of mild social isolation on dietary choices.

These findings also highlight the challenges inherent in recruiting a representative sample of older individuals for studies on social isolation. The older population with significant levels of social isolation may be less likely to participate in research, leading to an underrepresentation of this group in studies supposed to assess their behaviors and preferences. This limitation is crucial for future research, as it suggests the need for innovative recruitment strategies that ensure a more diverse and representative sample that includes individuals experiencing varying degrees of social isolation.

References

Acierno, R., Hernandez, M. A., Amstadter, A. B., Resnick, H. S., Steve, K., Muzzy, W., & Kilpatrick, D. G. (2010). Prevalence and correlates of emotional, physical, sexual, and financial abuse and potential neglect in the United States: The national elder mistreatment study. *American Journal of Public Health*, *100*(2), 292–297. https://doi.org/10.2105/AJPH.2009.163089

Airhihenbuwa, C. O. (1995). *Health and culture: Beyond the Western paradigm*. Sage Publishers.

Aldrich. O. J, & Cunningham. B. J. (2016). Pearson's correlation and Spearman's correlation. In Knight. V, McDuffee. Y, & Allen. C. B (Eds.), *Using IBM® SPSS® Statistics an Interactive Hands-On Approach* (2nd ed., pp. 219–231). SAGE.

Amarya, S., Singh, K., & Sabharwal, M. (2018). Ageing process and physiological changes. In *Gerontology*. InTech. https://doi.org/10.5772/intechopen.76249

Baltes, P. B. (1993). The aging mind: Potential and limits. *The Gerontologist*, *33*(5), 580–594. https://doi.org/10.1093/geront/33.5.580

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bartkiene, E., Steibliene, V., Adomaitiene, V., Juodeikiene, G., Cernauskas, D., Lele, V., Klupsaite, D., Zadeike, D., Jarutiene, L., & Guiné, R. P. F. (2019). Factors affecting consumer food preferences: Food taste and depression-based evoked emotional expressions with the use of face reading technology. *BioMed Research International*, *2019*, 1–10. https://doi.org/10.1155/2019/2097415

Boland, M. (2016). Human digestion – A processing perspective. *Journal of the Science of Food and Agriculture*, *96*(7), 2275–2283. https://doi.org/10.1002/jsfa.7601

Boyce, J. M., & Shone, G. R. (2006). Effects of ageing on smell and taste. *Postgraduate Medical Journal*, *82*(966), 239–241. https://doi.org/10.1136/pgmj.2005.039453

Button, K. S., Ioannidis, J. P. A., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S. J., & Munafò, M. R. (2013). Power failure: Why small sample size undermines the reliability of neuroscience. *Nature Reviews Neuroscience*, *14*(5), 365–376. https://doi.org/10.1038/nrn3475

Cacioppo, S., Capitanio, J. P., & Cacioppo, J. T. (2014). Toward a neurology of loneliness. *Psychological Bulletin*, *140*(6), 1464–1504. https://doi.org/10.1037/a0037618

Matos, A, D., Barbosa, F., Cunha, C., Voss, G., & Correia, F. (2021). Social isolation, physical inactivity and inadequate diet among European middle-aged and older adults. *BMC Public Health*, *21*(1), 924. https://doi.org/10.1186/s12889-021-10956-w

Dibartolo, M. C., & McCrone, S. (2003). Recruitment of rural community-dwelling older adults: Barriers, challenges, and strategies. *Aging and Mental Health*, *7*(2), 75–82. https://doi.org/10.1080/1360786031000072295

Doty, R. L., Shaman, P., Applebaum, S. L., Giberson, R., Siksorski, L., & Rosenberg, L. (1984). Smell identification ability: Changes with age. *Science*, *226*(4681), 1441–1443. https://doi.org/10.1126/science.6505700

Duberstein, P. R., Conwell, Y., Conner, K. R., Eberly, S., Evinger, J. S., & Caine, E. D. (2004). Poor social integration and suicide: Fact or artifact? A case-control study. *Psychological Medicine*, *34*(7), 1331–1337. https://doi.org/10.1017/S0033291704002600

Ebeling, M., Rau, R., Malmström, H., Ahlbom, A., & Modig, K. (2021). The rate by which mortality increase with age is the same for those who experienced chronic disease as for the general population. *Age and Ageing*, *50*(5), 1633–1640. https://doi.org/10.1093/ageing/afab085

Eisenberger, N. (2012). The pain of social disconnection: Examining the shared neural underpinnings of physical and social pain. *Nature Reviews Neuroscience, 13*, 421–434. https://doi.org/10.1038/nrn3231

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Fox, M. P., MacLehose, R. F., & Lash, T. L. (2021). *Applying quantitative bias analysis to epidemiologic data*. Springer International Publishing. https://doi.org/10.1007/978-3-030-82673-4

Gaines, A. D. (2010). Anosmia and hyposmia. *Allergy and Asthma Proceedings*, *31*(3), 185–189. https://doi.org/10.2500/aap.2010.31.3357

Galef, B. G. (1996). Social enhancement of food preferences in Norway rats: A brief review. In Heyes C. M. & Galef, Jr B. G (Eds), *Social learning in animals: The roots of culture* (pp. 49–64). Academic Press.

Goldstein, H., & Spiegelhalter, D. J. (1996). League tables and their limitations: Statistical issues in comparisons of institutional performance. *Journal of the Royal Statistical Society. Series A (Statistics in Society)*, *159*(3), 385. https://doi.org/10.2307/2983325

Grenade, L., & Boldy, D., (2008). Social isolation and loneliness among older people: Issues and future challenges in community and residential settings. *Australian Health Review*, *32*(3), 468. https://doi.org/10.1071/AH080468

Hanna, K., Cross, J., Nicholls, A., & Gallegos, D. (2023). The association between loneliness or social isolation and food and eating behaviours: A scoping review. *Appetite*, *191*, 107051. https://doi.org/10.1016/j.appet.2023.107051

Havighurst, R. J. (1961). Successful Aging. *The Gerontologist*, *1*(1), 8–13. https://doi.org/10.1093/geront/1.1.8

Hawkley, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, *40*(2), 218–227. https://doi.org/10.1007/s12160-010-9210-8

Henderson, A. R. (2005). The bootstrap: A technique for data-driven statistics. Using computer-intensive analyses to explore experimental data. *Clinica Chimica Acta*, *359*(1–2), 1–26. https://doi.org/10.1016/j.cccn.2005.04.002

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science*, *10*(2), 227–237. https://doi.org/10.1177/1745691614568352

Ige, J., Gibbons, L., Bray, I., & Gray, S. (2019). Methods of identifying and recruiting older people at risk of social isolation and loneliness: A mixed methods review. *BMC Medical Research Methodology*, 19(1), 181. https://doi.org/10.1186/s12874-019-0825-6

Imoscopi, A., Inelmen, E. M., Sergi, G., Miotto, F., & Manzato, E. (2012). Taste loss in the elderly: Epidemiology, causes and consequences. *Aging Clinical and Experimental Research*, *24*(6), 570–579. https://doi.org/10.1007/BF03654833

Institute of Health Metrics and Evaluation. (2023, October 20). *Global Health Data Exchange (GHDx)*. Institute of Health Metrics and Evaluation. https://ghdx.healthdata.org/

Instituto Nacional de Estatística. (2017). *Censos 2021*. https://www.ine.pt.

Kalousova, L. (2014). Social isolation as a risk factor for inadequate diet of older Eastern Europeans. *International Journal of Public Health*, *59*(5), 707–714. https://doi.org/10.1007/s00038-014-0582-6

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

Levy, B. R., Slade, M. D., & Kasl, S. V. (2002). Longitudinal benefit of positive self-perceptions of aging on functional health. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *57*(5), P409–P417. https://doi.org/10.1093/geronb/57.5.P409

Locher, J. L., Robinson, C. O., Roth, D. L., Ritchie, C. S., & Burgio, K. L. (2005). The effect of the presence of others on caloric intake in homebound older adults. *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*, *60*(11), 1475–1478. https://doi.org/10.1093/gerona/60.11.1475

Low, E., D'Cunha, N. M., Georgousopoulou, E., Naumovski, N., Bacon, R., Isbel, S., Brocklehurst, M., Reynolds, M., Ryan, D., & Kellett, J. (2024). Risk of social isolation as a contributing factor to diet quality in community-dwelling older persons living in the Australian capital Territory—A pilot study. *Healthcare*, *12*(5), 539. https://doi.org/10.3390/healthcare12050539

Markovina, J., Stewart-Knox, B. J., Rankin, A., Gibney, M., de Almeida, M. D. V., Fischer, A., Kuznesof, S. A., Poínhos, R., Panzone, L., & Frewer, L. J. (2015). Food4Me study: Validity and reliability of Food Choice Questionnaire in 9 European countries. *Food Quality and Preference*, *45*, 26–32. https://doi.org/10.1016/j.foodqual.2015.05.002

McGregor, R. A., Cameron-Smith, D., & Poppitt, S. D. (2014). It is not just muscle mass: A review of muscle quality, composition and metabolism during ageing as determinants of muscle

function and mobility in later life. *Longevity & Healthspan*, *3*(1), 9. https://doi.org/10.1186/2046-2395-3-9

Morley, J. E., Silver, A. J., Miller, D. K., & Rubenstein, L. Z. (1989). The anorexia of the elderly. *Annals of the New York Academy of Sciences*, *575*(1), 50–59. https://doi.org/10.1111/j.1749-6632.1989.tb53231.x

Mota-Pinto, A., Rodrigues, V., Botelho, A., Veríssimo, M. T., Morais, A., Alves, C., Rosa, M. S., & de Oliveira, C. R. (2011). A socio-demographic study of aging in the Portuguese population: The EPEPP study. *Archives of Gerontology and Geriatrics*, *52*(3), 304–308. https://doi.org/10.1016/j.archger.2010.04.019

Naik, S., Maganur, P., Khanagar, S. B., Al-Ehaideb, A., Vishwanathaiah, S., Shivanna, M. M., Ul Haq, I., & Al Kheraif, A. A. (2021). Age-related oral changes and their impact on oral health-related quality of life among frail elderly population: A review. *The Journal of Contemporary Dental Practice*, *21*(11), 1298–1303. https://doi.org/10.5005/jp-journals-10024-2954

National Academies of Sciences, Engineering, and Medicine. (2020). Assessment of social isolation and loneliness in research. In *Social isolation and loneliness in older adults: Opportunities for the health care system.* Washington, DC.

Nicholson, N. R. (2009). Social isolation in older adults: An evolutionary concept analysis. *Journal of Advanced Nursing*, *65*(6), 1342–1352. https://doi.org/10.1111/j.1365-2648.2008.04959.x

Nicholson, N. R. (2012). A review of social isolation: An important but underassessed condition in older adults. *The Journal of Primary Prevention*, *33*(2–3), 137–152. https://doi.org/10.1007/s10935-012-0271-2

Ory, M. (2003). Challenging aging stereotypes: Strategies for creating a more active society. *American Journal of Preventive Medicine*, *25*(3), 164–171. https://doi.org/10.1016/S0749-3797(03)00181-8

Ory, M. G., Lipman, P. D., Karlen, P. L., Gerety, M. B., Stevens, V. J., Singh, M. A. F., Buchner, D. M., & Schechtman, K. B. (2002). Recruitment of older participants in frailty/injury prevention studies. *Prevention Science, 3*(1), 1-22. https://doi.org/10.1023/A:1014610325059

Prizeman, K., Weinstein, N., & McCabe, C. (2023). Effects of mental health stigma on loneliness, social isolation, and relationships in young people with depression symptoms. *BMC Psychiatry*, *23*(1), 527. https://doi.org/10.1186/s12888-023-04991-7

Robino, A., Mezzavilla, M., Pirastu, N., La Bianca, M., Gasparini, P., Carlino, D., & Tepper, B. J. (2016). Understanding the role of personality and alexithymia in food preferences and PROP taste perception. *Physiology & Behavior*, *157*, 72–78. https://doi.org/10.1016/j.physbeh.2016.01.022

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs*, *2*(4), 328–335. https://doi.org/10.1177/109019817400200403

Roy, K., Smilowitz, S., Bhatt, S., & Conroy, M. L. (2023). Impact of social isolation and loneliness in older adults: Current understanding and future directions. *Current Geriatrics Reports*, *12*(3), 138–148. https://doi.org/10.1007/s13670-023-00393-5

Rozin, P. (2005). The meaning of food in our lives: A cross-cultural perspective on eating and well-being. *Journal of Nutrition Education and Behavior*, *37*, s107–s112.

Rumsey, J. D. (2011). Looking for links: Correlation and regression. In Collins, C. (Ed.), *Statistics for Dummies* (2nd ed.). Wiley Publishing.

Saif, N. T., Addison, O. R., Hughes Barry, K., Falvey, J. R., & Parker, E. A. (2023). Associations between social isolation and diet quality among US adults with disability participating in the National Health and Nutrition Examination Survey, 2013–2018. *Preventive Medicine Reports*, *36*, 102413. https://doi.org/10.1016/j.pmedr.2023.102413

Santos-Eggimann, B., Cuénoud, P., Spagnoli, J., & Junod, J. (2009). Prevalence of frailty in middle-aged and older community-dwelling Europeans living in 10 countries. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*, *64*(6), 675–681. https://doi.org/10.1093/gerona/glp012

Shlisky, J., Bloom, D. E., Beaudreault, A. R., Tucker, K. L., Keller, H. H., Freund-Levi, Y., Fielding, R. A., Cheng, F. W., Jensen, G. L., Wu, D., & Meydani, S. N. (2017). Nutritional considerations for healthy aging and reduction in age-related chronic disease. *Advances in Nutrition*, *8*(1), 17–26. https://doi.org/10.3945/an.116.013474

Sinding, C., Puschmann, L., & Hummel, T. (2014). Is the age-related loss in olfactory sensitivity similar for light and heavy molecules? *Chemical Senses*, *39*(5), 383–390. https://doi.org/10.1093/chemse/bju004

Spence, C. (2017). Comfort food: A review. *International Journal of Gastronomy and Food Science, 9*, 105–109. https://doi.org/10.1016/j.ijgfs.2017.07.001

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The Food Choice Questionnaire. *Appetite, 25*(3), 267-284. https://doi.org/10.1006/appe.1995.0061

Surkalim, D. L., Luo, M., Eres, R., Gebel, K., van Buskirk, J., Bauman, A., & Ding, D. (2022). The prevalence of loneliness across 113 countries: Systematic review and meta-analysis. *BMJ, 376*, e067068. https://doi.org/10.1136/bmj-2021-067068

Swendeman, D., Ingram, B. L., & Rotheram-Borus, M. J. (2009). Common elements in self-management of HIV and other chronic illnesses: An integrative framework. *AIDS Care*, *21*(10), 1321–1334. https://doi.org/10.1080/09540120902803158

Tara W. Strine, Ali H. Mokdad, Lina S. Balluz, Olinda Gonzalez, Raquel Crider, Joyce T. Berry, & Kurt Kroenke. (2008). Depression and anxiety in the United States: Findings from the 2006 behavioral risk factor surveillance system. *Psychiatric Services*, *59*(12), 1383–1390. https://doi.org/110.1176/ps.2008.59.12.1383

Tavares, J., Faria, A., Gonçalves, D., Mendes, D., Silva, S., & Sousa, L. (2023). Validation of the Portuguese version of the social isolation scale with a sample of community-dwelling older adults. *International Journal of Nursing Sciences*, *10*(2), 151–157. https://doi.org/10.1016/j.ijnss.2023.03.002

Taylor, H. O., Cudjoe, T. K. M., Bu, F., & Lim, M. H. (2023). The state of loneliness and social isolation research: Current knowledge and future directions. *BMC Public Health*, *23*(1), 1049. https://doi.org/10.1186/s12889-023-15967-3

Teo, R. H., Cheng, W. H., Cheng, L. J., Lau, Y., & Lau, S. T. (2023). Global prevalence of social isolation among community-dwelling older adults: A systematic review and meta-analysis. *Archives of Gerontology and Geriatrics*, *107*, 104904. https://doi.org/10.1016/j.archger.2022.104904

Thompson, M. G., Heller, K., & Rody, C. A. (1994). Recruitment challenges in studying late-life depression: Do community samples adequately represent depressed older adults? *Psychology and Aging, 9*(1), 121-125. https://doi.org/10.1037//0882-7974.9.1.121

Toffanello, E., Donini, Inelmen, Imoscopi, Perissinotto, Coin, Miotto, Manzato, Sergi, Barbagallo, & Cuccinotta. (2013). Taste loss in hospitalized multimorbid elderly subjects. *Clinical Interventions in Aging, 8*, 167–174. https://doi.org/10.2147/CIA.S37477

Tomova, L., Wang, K. L., Thompson, T., Matthews, G. A., Takahashi, A., Tye, K. M., & Saxe, R. (2020). Acute social isolation evokes midbrain craving responses similar to hunger. *Nature Neuroscience*, *23*(12), 1597–1605. https://doi.org/10.1038/s41593-020-00742-z

United Nations Department of Economic and Social Affairs, Population Division (2024). World population prospects 2024: Summary of Results (UN DESA/POP/2024/TR/NO. 9). https://desapublications.un.org/publications/world-population-prospects-2024-summary-results

Vozoris, N. T., & Tarasuk, V. S. (2003). Household food insufficiency is associated with poorer health. *Journal of Nutrition*, *133*(1), 120–126. https://doi.org/10.1093/jn/133.1.120

Whitelock, E., & Ensaff, H. (2018). On your own: Older adults' food choice and dietary habits. *Nutrients*, *10*(4), 413. https://doi.org/10.3390/nu10040413

Wilson Van Voorhis, C. R., & Morgan, B. L. (2007). Understanding power and rules of thumb for determining sample sizes. *Tutorials in Quantitative Methods for Psychology*, *3*(2), 43–50. https://doi.org/10.20982/tqmp.03.2.p043

World Health Organization. (2022, November 1). Ageing and Health. *WHO*. https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

Zhang, X., Ravichandran, S., Gee, G. C., Dong, T. S., Beltrán-Sánchez, H., Wang, M. C., Kilpatrick, L. A., Labus, J. S., Vaughan, A., & Gupta, A. (2024). Social isolation, brain food cue processing, eating behaviors, and mental health symptoms. *JAMA Network Open*, *7*(4), e244855. https://doi.org/10.1001/jamanetworkopen.2024.4855

Appendix

Survey

Informed Consent

Caro/a participante,

É convidado/a a participar de uma investigação que está a ser realizada na Faculdade de Educação e Psicologia da Universidade Católica Portuguesa no Porto (FEP-UCP, Portugal) pelo grupo de investigação do Human Neurobehavioral Laboratory (HNL). Antes de concordar em participar, por favor leia atentamente a informação que se segue para perceber melhor os objetivos do estudo e o que envolverá a sua participação.

Qual é o objetivo do estudo?

Este estudo insere-se no projeto "Diet 65+", que procura avaliar as perceções das pessoas acima de 65+ sobre as suas preferências alimentares, explorando também associações com outros aspetos do dia a dia, como seja a sua interação com outras pessoas e participação em atividades sociais.

Em que consiste a minha participação?

Numa primeira fase, vamos pedir que responda a um conjunto de questões sociodemográficas e de saúde, assim como preencha dois questionários breves, um sobre preferências alimentares e outro acerca da sua interação com outras pessoas. Espera-se que esta parte do estudo demore cerca de 20 a 25 minutos.

Se tiver disponibilidade, poderá também ser convidado/a a participar num momento de reflexão em pequeno grupo sobre preferências alimentares, que será realizado presencialmente num dia e hora a combinar com a equipa de investigação e de acordo com a sua disponibilidade. As partilhas dos participantes serão gravadas em áudio para depois serem analisadas. Estima-se que esta parte demore cerca de 1h a 1h30.

Quais são os meus direitos?

A sua participação é voluntária e a informação que partilhar no contexto do estudo é confidencial, servindo apenas para fins de investigação por parte do nosso grupo, como seja a realização de trabalhos académicos, publicações e apresentações em encontros científicos. Poderá esclarecer todas as dúvidas e questões que tiver antes, durante ou depois da

sua colaboração no estudo, junto das investigadoras, quer seja presencialmente ou via e-mail (ver contactos abaixo). É também livre de desistir deste estudo a qualquer momento, caso seja esse o seu desejo e sem que existam quaisquer consequências para si.

Como serão tratados os meus dados?
Todos os dados recolhidos serão guardados de forma segura e acessíveis apenas à equipa relacionada com o projeto "Diet 65+", garantindo-se a proteção dos seus dados. Os dados são confidenciais e as análises serão realizadas considerando todos os participantes do estudo, não sendo analisados casos individuais.

Como posso contactar a equipa de investigação?
Para qualquer esclarecimento adicional ou para conhecer os resultados da investigação, poderá contactar as responsáveis do estudo:
- Investigadora Diana Almeida - s-dialloalmeida@ucp.pt
- Investigadora Jessyca Qiu - s-jqiu@ucp.pt
- Grupo de investigação onde se insere o estudo - HNL - hnl@porto.ucp.pt
- Supervisoras do estudo - Patrícia Oliveira-Silva - posilva@ucp.pt; Diana R. Pereira drpereira@ucp.pt

Se concordar participar, por favor selecione cada uma das opções abaixo:
- Declaro ter lido e compreendido a informação que me foi dada, tendo tido oportunidade de esclarecer dúvidas relativas à minha participação junto de membros da equipa de investigação.
- Tenho 65 ou mais anos.
- Tomei conhecimento que não preciso de responder a determinadas questões se não quiser e posso desistir deste estudo a qualquer momento.
- Os meus dados serão tratados de forma confidencial, seguindo as recomendações ao nível da Lei de Proteção de Dados.
- Ao avançar neste formulário, confirmo que aceito participar neste estudo.

Sociodemographic Questionnaire

Q1. Por favor, indique a sua idade:

Q2. Por favor, indique o seu sexo:

( ) Feminino

( ) Masculino

( ) Prefiro não responder

Q3. Por favor, indique o seu estado civil:

( ) Solteiro(a)

( ) União de facto/ Casado (a)

( ) Separado(a)/ Divorciado(a)

( ) Viúvo(a)

Q4. Por favor, indique as suas habilitações académicas (concluídas):

( ) 1º ciclo do ensino básico (4º ano)

( ) 2º ciclo do ensino básico (6ª ano)

( ) 3º ciclo do ensino básico (9º ano)

( ) Ensino secundário (12º ano)

( ) Bacharelato/ Licenciatura

( ) Mestrado

( ) Doutoramento

( ) Outro. Qual?

Q5. Como classifica a zona onde vive?

( ) Predominantemente rural

( ) Moderadamente urbana

( ) Predominantemente urbana

( ) Não sabe julgar/ prefere não responder

Q6. Por favor, indique com quem vive:

( ) Sozinho (a)

( ) Cônjuge

( ) Amigos

( ) Familiares

( ) Outro (por favor especifique)

Q7. Qual das seguintes descrições se aproxima mais do que sente relativamente ao rendimento atual do seu agregado familiar?

( ) O rendimento atual permite viver confortavelmente

( ) O rendimento atual dá para viver

( ) É difícil viver com o rendimento atual

( ) É muito difícil viver com o rendimento atual

( ) Não sabe julgar/ prefere não responder

Q8. Que atividades de lazer costuma fazer no seu quotidiano?

( ) Passar tempo com a família

( ) Atividades sociais com amigos

( ) Tomar conta dos netos

( ) Atividades de lazer fora de casa

( ) Atividades religiosas

( ) Viajar

( ) Voluntariado

( ) Estudar

( ) Outro(a) - Qual(ais)?

Q9. Atualmente, é fumador?

( ) Sim

( ) Não

Q10. Tem algum problema que tenha afetado ou afete atualmente a sua saúde? (ex: perturbação alimentar; diabetes; hipertensão; alterações visuais ou auditivas)

( ) Sim _____

( ) Não

Q11. Encontra-se a ser acompanhado/ a regularmente em alguma consulta de especialidade hospitalar?

( ) Sim _____

( ) Não

Q12. Já foi alguma vez hospitalizado(a)?

( ) Sim _____

( ) Não

Q13. Encontra-se atualmente a tomar alguma medicação de forma regular?

( ) Sim _____

( ) Não

Q14. De uma forma geral considera a sua saúde?

( ) Muito Boa

( ) Boa

( ) Aceitável

( ) Fraca

( ) Muito Fraca

Q15. Possui alguma alteração ao nível oral (perda de dentes, uso de próteses dentárias)?

( ) Sim _____

( ) Não

Obrigada pela sua participação!

Detailed Data Tables

Frequency Table

Social demographic information

Frequency Table for Age

	n	%
65	11	18.6%
66	9	15.3%
67	8	13.6%
68	6	10.2%
69	2	3.4%
70	4	6.8%
71	3	5.1%
72	3	5.1%
73	2	3.4%

74	2	3.4%
75	1	1.7%
77	3	5.1%
78	1	1.7%
81	1	1.7%
82	1	1.7%
83	1	1.7%
87	1	1.7%

Frequency Table for Marital Status

	n	%
Single	4	6.8%
Married	42	71.2%
Divorced	8	13.6%
Widower	5	8.5%

Frequency Table for Education Level

	n	%
1st cycle of basic education (4th year)	3	5.1%
2nd cycle of basic education (6th year)	8	13.6%
3rd cycle of basic education (9th year)	24	40.7%
Secondary education (12th year)	12	20.3%
Bachelor's degree	5	8.5%
Others	7	11.9%

Frequency Table for Living Areas

	n	%
Predominantly rural	3	5.1%
Moderately urban	42	71.2%
Predominantly urban	12	20.3%
Does not know how to judge/prefers not to respond	2	3.4%

Frequency Table for Income Level

	n	%
Current income allows to live comfortably	26	44.1%
Current income is enough to live on	30	50.8%
It is very difficult to live on current income	1	1.7%
Does not know how to judge/prefers not to respond	2	3.4%

Frequency Table for Chronic Health Problem

	n	%
Yes	34	57.6%
No	25	42.4%

Normality test

Tests of Normality for SIS and FCQ

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total Social Isolation Score	.187	59	<.001	.904	59	<.001
Health	.127	59	.018	.909	59	<.001
Mood	.114	59	.053	.918	59	<.001
Convenience	.222	59	<.001	.855	59	<.001
Sensory Appeal	.193	59	<.001	.848	59	<.001
Natural Content	.331	59	<.001	.728	59	<.001
Price	.356	59	<.001	.663	59	<.001
Weight Control	.179	59	<.001	.857	59	<.001
Familiarity	.124	59	.024	.937	59	.005
Ethical Concerns	.177	59	<.001	.917	59	<.001

a. Lilliefors Significance Correction