



Article

Fostering Resilience and Wellness: The Synergy of Mindful Eating and the Mediterranean Lifestyle

Efstratios Christodoulou¹, Georgia-Eirini Deligiannidou² , Christos Kontogiorgis² , Constantinos Giaginis¹ and Antonios E. Koutelidakis^{1,*}

¹ Laboratory of Nutritional and Public Health, Department of Food Science and Nutrition, University of the Aegean, 81400 Myrina, Greece; fnsd22002@aegean.gr (E.C.); cgiaginis@aegean.gr (C.G.)

² Laboratory of Hygiene and Environmental Protection, School of Medicine, Democritus University of Thrace, Dragana, 68100 Alexandroupolis, Greece; edeligia@med.duth.gr (G.-E.D.)

* Correspondence: akoutel@aegean.gr; Tel.: +30-2254083123

Abstract: Increasing evidence indicates that the cultivation of mindful eating, adherence to the Mediterranean lifestyle, and the development of psychological resilience may contribute to the enhancement of overall health and well-being. The purpose of this study was to explore the association between mindful eating and the Mediterranean lifestyle in relation to psychological resilience and the maintenance of a healthy weight. In the framework of a cross-sectional study, 288 individuals voluntarily took part in an online research survey conducted in Greece. Results showed that both mindful eating and the Mediterranean diet were significantly correlated ($p < 0.001$) with psychological resilience. Multiple regression models identified mindful eating and the Mediterranean diet as predictive factors of psychological resilience ($p < 0.001$). There was a statistically significant ($p < 0.05$) intercorrelation between mindful eating, the Mediterranean diet, and psychological resilience. Following the application of multiple regression models, mindful eating and Mediterranean diet were identified as predictive factors of psychological resilience ($p < 0.0001$). Individuals with a normal Body Mass Index (BMI) displayed stronger adherence to mindful eating and the Mediterranean lifestyle, in contrast to those classified in the overweight and obesity BMI groups. People with higher mindful eating scores had 14% better odds of maintaining their weight loss after a weight-reducing diet than those with a lower mindful eating score (OR: 1.142, 95% CI: 1.084, 1.204, $p < 0.0001$). In summary, the integration of mindful eating and the Mediterranean lifestyle may represent a feasible approach to bolstering psychological resilience, overall health, and well-being.

Keywords: mindful eating; Mediterranean lifestyle; psychological resilience; mindfulness; obesity



Citation: Christodoulou, E.; Deligiannidou, G.-E.; Kontogiorgis, C.; Giaginis, C.; Koutelidakis, A.E. Fostering Resilience and Wellness: The Synergy of Mindful Eating and the Mediterranean Lifestyle. *Appl. Biosci.* **2024**, *3*, 59–70. <https://doi.org/10.3390/applbiosci3010004>

Academic Editor: Burkhard Poeggeler

Received: 8 November 2023

Revised: 6 December 2023

Accepted: 15 January 2024

Published: 17 January 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Public health promotion is becoming increasingly crucial, as physical–mental health and well-being are part of a feedback system that affects all aspects of human activity [1,2]. The COVID-19 pandemic, combined with ongoing lockdowns and limited economic, professional, and social activity, have tested public health [3]. The pandemic outbreak [4], in addition to its high toll on human lives, the extraordinary struggle of health professionals, and the environmental, economic, and social impact [5], which is yet to be fully realized, has also put forward essential defects of public health systems in communal, national, and global level [6]. Additionally, efforts are being made in order to evaluate the personal and social psychological repercussions of this ongoing distress [7].

Psychological resilience, a concept in psychology that refers to an individual's ability to adapt and cope effectively with stress, adversity, and life challenges, is considered an important factor that could improve people's health and well-being [8]. Beyond the psychological factor, nutrition can also affect mental health and well-being [9]. One of the dietary patterns that has been extensively researched and recognized for enhancing

health is the Mediterranean diet. The Mediterranean diet is renowned for its health advantages owing to olive oil consumption in conjunction with the abundance of complex carbohydrates found in whole grains, fruits, wild greens, and vegetables. Consumption of simple carbohydrates like refined sugars is typically restricted. Portion sizes typically emphasize moderate servings of nutrient-rich foods. This diet is also moderate in dairy and red meat consumption while favoring herbs and spices over salt for flavoring, which may contribute to lowering the risk of chronic diseases like cardiovascular issues, diabetes, and certain cancers. The combination of these elements is linked to a normal BMI and promotes overall well-being and longevity [10]. A structure that combines both psychology and nutrition is mindful eating. Mindful eating is a practice that involves bringing one's full attention and awareness to the experience of eating. It is based on the principles of mindfulness, which is a type of meditation that involves paying attention to the present moment with a non-judgmental and accepting attitude [11]. Both mindful eating and the Mediterranean diet are not a specific diet plan or a weight-loss program, but rather a general pattern of eating that is part of a healthful diet [12,13].

The choice of a healthful diet presupposes knowledge but also experience, which Aristotle in the 4th century BC defined as *phronesis*. Aristotle valued *phronesis* as the highest spiritual virtue. In his work, *Nicomachean Ethics*, Book VI, in order to explain its importance, he gives an example of the application of *phronesis* to diet, writing: "if a man knows that light meat is easily digested and therefore salubrious, but does not know what kinds of meat are light, he will not be so likely to restore you to health as a man who merely knows that chicken is wholesome" [14].

Phronesis, one of the basic principles of Aristotelian *Eudaemonia*, is a word that has no common English translation. According to McEvilley [15], a scholar of ancient Greek philosophy, the most accurate translation of *phronesis* into English is mindfulness. Although mindfulness has been associated with Buddhism, the exchange of philosophical views between ancient Greece and Eastern civilization may have contributed to the formation of its philosophy [16]. Weiss [16], accepting the definition of *phronesis* as mindfulness, states that the connecting link between *phronesis* and mindfulness is *eudaemonia*. *Eudaemonia*, which is a reference point in the present study, is one of the important components of well-being. The theoretical framework of well-being and its separation into hedonistic and *eudaemonic* components has contributed to a better understanding of the mechanisms that mediate its promotion. Both hedonistic and *eudaemonic* well-being seem to be associated with psychological resilience [8,13].

Mindfulness, which is inspired by the values of *eudaemonia*, seems to have positive effects on psychological resilience and adherence to a healthy diet [11,17]. The Mediterranean lifestyle, as epitomized by adherence to the Mediterranean diet and active-natural living, appears to have a positive effect on health and well-being [10]. Although these concepts share common values and mechanisms at their core, their connection has not been thoroughly examined.

Mindful eating, an evolving scientific trend, could be the connecting link between these concepts. The hypotheses of this study were that mindful eating and the Mediterranean lifestyle are associated with psychological resilience and maintaining a healthy body weight, and that all three of them were inspired by Aristotelian *eudaemonic* values. The purpose of this study was to investigate the association between mindful eating and the Mediterranean diet and lifestyle with psychological resilience, body weight, and eating behavior.

2. Materials and Methods

2.1. Design and Procedure

The type of study chosen was a cross-sectional study [18]. An online questionnaire was used for data collection, which was designed and implemented using Sogolytics online survey tool [19].

The questionnaire was offered both in Greek and English. The first three survey questions served as inclusion/exclusion criteria. The first question concerned acceptance of

the terms and conditions of research participation regarding data protection, confidentiality, and anonymity of the participants, with those who did not accept them being excluded. The second and third questions concerned age and occupation, respectively. People under the age of 25 or over the age of 65, as well as pupils/students or pensioners, were barred from participating in the study's continuation. The exclusion of specific groups was chosen for the research participants to come from the workforce (quota sampling). This decision was made because psychological resilience is a factor that is frequently researched in the workplace, as it contributes significantly to the well-being and performance at work [20]. Derived from the Greek population, the total sample size necessary, with a 95% confidence level and a 5% confidence interval, was established at 384 individuals [21].

Participants were recruited through social media (LinkedIn, Facebook, Instagram) invitations in Greek domains. The survey was also distributed directly and selectively to the authors' social circle via instant messaging apps like Viber and WhatsApp (purposive sampling), with follow-up reminders to encourage participant engagement and provide a platform for addressing any questions or concerns about the study. Transparency, a non-exceptionalist methodology, privacy respect, and adherence to the terms of use of social media platforms were all part of the recruiting process [22]. A pilot study with a sample of 40 people was conducted before the survey was officially distributed to check for potential ambiguities [23]. Data structure, distribution, collection, and analysis were all flawless. The data from the pilot study was incorporated into the final sample. The survey's official distribution began in September 2021 and ended in November 2021. Before collecting data, the analytic plan and hypotheses of this study were specified.

2.2. Ethics and Deontology Issues

The research adhered entirely to the prescribed ethical standards outlined in the Declaration of Helsinki. Participation in the study required agreeing to its terms and conditions. Approval for research application no. 17715/9 September 2021 was granted by the University of the Aegean's ethics and deontology committee based on its alignment with the university's Code of Ethics and Deontology of Research, encompassing ethical, deontological, and legal guidelines. This study received no funding and had no conflicts of interest.

2.3. Scales

2.3.1. Mindful Eating Scale-16 (MES-16)

The MES-16 is an abbreviated version of the 28-item Mindful Eating Scale (MES-28). MES-28 was developed by Hulbert-Williams et al. [24] to address the need for a robust and theoretically conscious alignment measure specifically for the food sector [25]. Hulbert-Williams et al. [26] identified some inadequate psychometric properties in the data and a sub-scale in MES-28. To improve their original scale, they proceeded to remove them. The final form of the new abbreviated scale consists of 16 elements divided into five sub-scales. The five sub-scales are self-acceptance, awareness, inaction or routine, and conscious action. The MES-16 is rated on a Likert scale. The Likert scale is a scale for evaluating opinions or behavior, where the examinee is asked to answer close-ended questions, choosing answers in the form of scales that indicate a different degree of agreement [27]. A typical question of the MES-16 scale is, "I eat something without really being aware of it". The MES-16 answer options are divided into four levels (never, rarely, sometimes, always), and the answers are graded from 1 to 4 points. The final score of MES-16 ranges from 16 to 64 points. A higher score indicates increased mindful eating.

This scale was chosen because its abbreviated version is the scale that best reflects the characteristics and principles of mindfulness as they apply to nutrition [26]. In the current study, the internal consistency index (Cronbach's) of the MES-16 scale was $\alpha = 0.75$. Cronbach's α between 0.7 and 0.8 is described by George and Mallery (2003) as "acceptable". The Cronbach's of the MES-16 sub-scale were $\alpha = 0.846$ for acceptance, $\alpha = 0.841$ for

awareness, $\alpha = 0.790$ for non-reactivity, $\alpha = 0.734$ for routine, and $\alpha = 0.799$ for acting with awareness, and they correspond to those of the original scale of Hulbert-Williams et al. [26].

2.3.2. Mediterranean Diet Adherence Scale (14-MEDAS)

The 14-MEDAS scale, developed by Schroeder et al. [28] as part of the PREDIMED study, comprises 14 items aimed at evaluating adherence to the Mediterranean diet. A typical question from the 14-MEDAS is, “Is olive oil your primary culinary fat”? Each question is scored on a scale of 0 to 1, contributing to a total score between 0 and 14. Scores between 0 and 5 indicate low adherence, 6 to 9 suggest moderate adherence, while 10 to 14 signify high adherence [28]. Validation studies conducted by Garcia-Conesa et al. [29] across different countries and languages, including Greek, demonstrated the Greek version’s substantial agreement ($81.2 \pm 10.7\%$) with the study’s Food Frequency Questionnaire (FFQ). This finding confirms the validity and reliability of the Greek 14-MEDAS as a tool for assessing adherence to the Mediterranean diet within the Greek population.

2.3.3. Connor-Davidson Resilience Scale 10-Item (CD-RISC-10)

The CD-RISC-10, a condensed version of the Connor and Davidson resilience scale [30], is a widely utilized tool for gauging psychological resilience. Comprising ten items selected from the original twenty-five, each response is graded on a Likert scale from 0 to 4. An example question from the CD-RISC-10 is, “I am able to adapt when changes occur”. Scores range from 0 to 40, with higher scores indicating heightened resilience. Tsigkaropoulou et al. [31] validated the CD-RISC-10 in Greek through a case-control study involving 546 individuals, affirming its reliability and validity for assessing psychological resilience in the Greek population. Within this study, the CD-RISC-10 demonstrated strong internal consistency, as indicated by a Cronbach’s α of 0.856.

2.3.4. Mediterranean Lifestyle and Well-Being Factors

It was decided to include questions about the respondents’ lifestyle in order to investigate the relationships between mindful eating, adherence to the Mediterranean lifestyle, and resilience with their eating behaviors, health, and well-being. The two most used factors associated with the Mediterranean lifestyle, according to previous studies, are increased physical activity and contact with nature [32]. The weekly threshold for increased physical activity was set at 3 h [33]. Increased contact with nature was defined as spending more than 2 h per week in its presence [34]. Questions that separated happiness as joy (hedonistic well-being or SWB) from happiness as meaning in life (eudaemonic or PWB) were included. Joy is at the heart of hedonistic well-being principles, while meaning is at the heart of eudaemonic well-being principles [35].

2.3.5. Demographic and Anthropometric Information

In order to reduce survey dropout rates [36], inquiries regarding demographic and somatometric information were placed towards the end of the survey. Demographic questions covered areas like education, employment, marital status, and gender. Participants were asked to provide their height and weight to calculate their BMI. Although using self-reported height and weight might not provide the most precise data on individuals’ body composition, it remains a valid method for calculating BMI in adult populations across various socio-demographic groups [37]. Additionally, the survey aimed to explore participants’ dietary habits by assessing whether they had previously attempted weight loss diets and the lasting effects on their body weight. Following established guidelines [38], participants’ BMIs were categorized into subgroups, such as underweight, normal weight, overweight, and obesity.

2.4. Statistical Analysis

A thorough review of the data was conducted to identify any potential omissions. Instances where participants abruptly discontinued the questionnaire (Missing Completely

at Random) resulted in the exclusion of the respective data from the analysis [39]. In the event of accidental oversights (Missing at Random), the missing data points were substituted with the mean value derived from all respondents' answers.

The data was exported in a format compatible with import and processing in SPSS v26 and R-Statistics v4.2.1. Analysis and visualization of the data were carried out using the statistical analysis software SPSS v26 and R-Statistics v4.2.1. Prior to subjecting the data to statistical tests, a regularity check was performed to ensure their distribution met established criteria. The literature recommends conducting the regularity test before engaging in statistical analyses. To ensure the most accurate and reliable assessment of regularity, a combination of visual examination and the Shapiro–Wilk test was employed [40]. The primary research variables underwent thorough regularity testing. The predetermined statistical significance level was established at $p < 0.05$.

3. Results

3.1. Sample

A total of 430 people participated in the survey. After excluding 125 people who did not meet the survey's inclusion criteria and 17 incomplete (less than 50% of total questions were answered) or random responses (questions answered in less than 3 min), the final sample consisted of 288 employed and unemployed people aged 25 to 65, selectively chosen to represent the workforce in Greece. The independent sample Kruskal–Wallis test revealed a statistically significant ($p < 0.05$) lower MES-16 score in women and a lower 14-MEDAS score in private sector employees. The CD-RISC-10 score was higher in the self-employed and lower in the unemployed. People in relationships had lower BMIs.

The descriptive statistics of mindful eating (MES-16), adherence to the Mediterranean diet (14-MEDAS), and resilience (CD-RISC-10) measurement scales in the final sample were calculated (Table 1). The MES-16, 14-MEDAS, and CD-RISC-10 scales in the present study follow a normal distribution, while BMI does not.

Table 1. Descriptive statistics of MES-16, 14-MEDAS, and CD-RISC-10.

	N	Min.	Max.	Mean	Std. Dev.
MES-16	288	27.00	59.00	43.84	6.35
14-MEDAS	288	1.00	11.00	6.69	1.69
CD-RISC-10	288	8.00	40.00	26.72	6.15

3.2. Correlations among Mindful Eating, the Mediterranean Diet, Psychological Resilience and BMI

In order to test the correlation between MES-16, 14-MEDAS, CD-RISC-10, and BMI, the Pearson and Spearman correlation coefficients were calculated. It was discovered that there was a statistically significant correlation between the MES-16 and 14-MEDAS scores, as well as the CD-RISC-10 score. BMI had a statistically significant negative correlation with the MES-16 and 14-MEDAS scores. No correlation was found between CD-RISC-10 and BMI (Table 2).

Table 2. Intercorrelations of MES-16, 14-MEDAS, CD-RISC-10, and BMI.

	MES-16	14-MEDAS	CD-RISC-10	BMI (§)
MES-16	1	0.150 *	0.302 ***	−0.257 ***
14-MEDAS	0.150 *	1	0.196 **	−0.127 *
CD-RISC-10	0.302 ***	0.196 **	1	−0.029
BMI (§)	−0.257 ***	−0.127 *	−0.029	1

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level. (2-tailed). *** Correlation is significant at the 0.001 level (2-tailed). § = Spearman's rho.

The five sub-scales of MES-16 were tested for any correlations with each other and the scores of the 14-MEDAS, CD-RISC-10, and BMI. A statistically significant positive correlation was found between the sub-scales of acceptance, awareness, and acting with awareness with 14-MEDAS. On the contrary, there was a statistically significant negative correlation between routine and 14-MEDAS. All sub-scales of MES-16 had a statistically significant positive correlation with CD-RISC-10 except for routine. Regarding BMI, acceptance and acting with awareness had a statistically significant positive correlation, whereas routine had a statistically significant negative correlation (Table 3).

Table 3. Intercorrelations of MES-16 sub-scales and the main variables of the research.

	Acceptance	Awareness	Non-reactivity	Routine	A.W.A. ¹	14-MEDAS	CD-RISC-10	BMI (§)
Acceptance	1	0.009	0.298 ***	−0.105	0.513 ***	0.216 ***	0.273 ***	−0.429 ***
Awareness	0.009	1	−0.025	−0.131 *	0.126 *	0.225 ***	0.184 **	−0.045
Non-reactivity	0.298 ***	−0.025	1	−0.222 ***	0.293 ***	−0.046	0.142 *	−0.039
Routine	−0.105	−0.131 *	0.222 ***	1	−0.107	−0.238 ***	−0.046	0.180 **
MES-16	0.513 ***	0.126 *	0.293 ***	−0.107	1	0.221 ***	0.237 ***	−0.245 ***
14-MEDAS	0.216 ***	0.225 ***	−0.046 **	−0.238 ***	0.221 ***	1	0.196 **	−0.127 *
CD-RISC-10	0.273 ***	0.185 **	0.142 *	−0.046	0.237 ***	0.196 **	1	−0.029
BMI (§)	−0.429 ***	−0.045 *	−0.039	0.180 **	−0.245 ***	−0.029	−0.029	1

¹ A.W.A: Act With Awareness. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level. (2-tailed). *** Correlation is significant at the 0.001 level (2-tailed). § = Spearman's rho.

3.3. Mindful Eating, the Mediterranean Diet-Lifestyle, and Psychological Resilience

The statistical test of multiple linear regression showed that the MES-16 score ($p < 0.0001$) and the 14-MEDAS score ($p = 0.007$) were statistically significant predictors of psychological resilience, as they explained 11.5% of its variance. With the same test, MES-16 and 14-MEDAS scores, along with physical activity and proximity to nature, explained 17.4% of psychological resilience's variance ($p < 0.001$).

After applying a one-way anova test, it was found that there was a statistically significant difference between the means of CD-RISC-10 in different adherence categories to the Mediterranean diet ($p < 0.05$). Application of the LSD post hoc test showed a statistically significant difference in the mean scores of CD-RISC-10 between poor and moderate adherence to the Mediterranean diet ($p = 0.002$).

3.4. Mindful Eating, the Mediterranean Diet, and Weight

Following the implementation of the independent sample Kruskal–Wallis test, results indicated a significant difference among the MES-16 score means across different BMI categories ($p = 0.001$). The independent sample Kruskal–Wallis test also revealed a difference in the means of the 14-MEDAS scores within various BMI categories, nearly reaching statistical significance ($p = 0.082$). Subsequent analysis through the post hoc LSD test unveiled a significant difference in the 14-MEDAS means between individuals with normal weight and those who were overweight ($p = 0.031$). After conducting an independent sample Kruskal–Wallis test and a post hoc LSD test, it was found that there was a statistically significant difference in the mean scores of MES-16 between those who maintained the weight they lost after dieting and those who regained the same or even greater weight or failed to achieve weight loss ($p < 0.0001$). A statistically significant difference ($p < 0.0001$) was also found between the BMI averages of the participants and the groups with different dietary outcomes (Figure 1).

Multinomial logistic regression analysis identified MES-16 as a prognostic factor in maintaining weight loss after diet, and also in having a normal BMI (Table 4).

Table 4. Multinomial logistic regression analysis.

	MES-16		
	OR	95% CI	p-Value
Maintaining vs. Regaining Weight	1.142	1.084–1.204	<0.001
Normal vs. Obesity BMI	1.113	1.057–1.172	<0.01

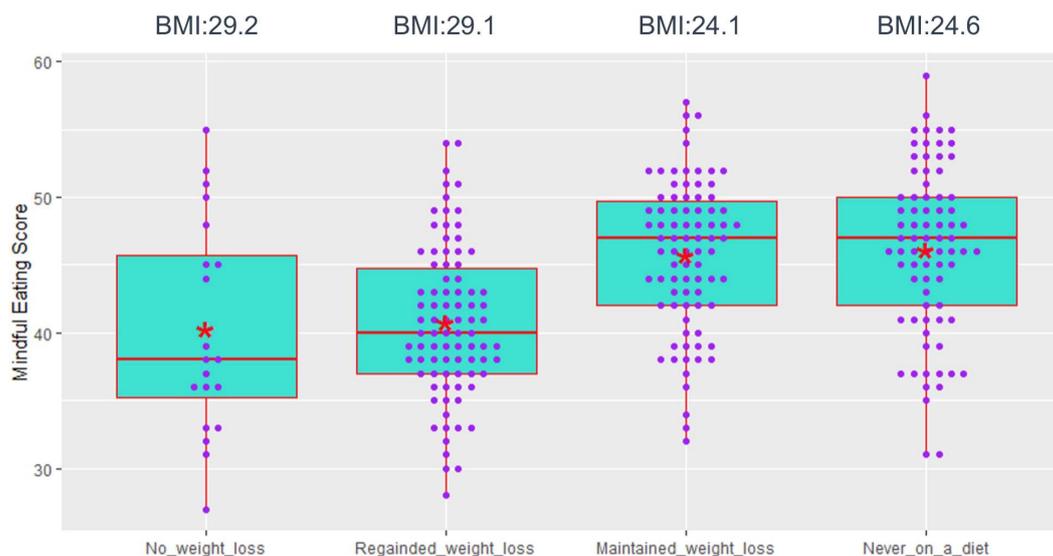


Figure 1. Beeswarm boxplots demonstrating the difference of the means of M.E.S score (*) in different diet outcomes.

3.5. Mindful Eating, the Mediterranean Diet, Psychological Resilience, and Overall Well-Being

On a Likert scale from 1 to 5, the weighted score of all respondents was 3.43 on a question related to their happiness, and 3.94 on a question related to their meaning in life. When one-way anova was applied to the question “how happy have you been in the last 12 months”, it revealed a statistically significant difference in the CD-RISC-10 score averages for the five different answers ($p < 0.0001$). In contrast, no statistically significant difference was found between the means of MES-16 and 14-MEDAS between the different levels of happiness. A one-way anova analysis of the responses to the question “How meaningful do you feel your life has been in the last 12 months” revealed a statistically significant difference in the mean scores of MES-16 ($p = 0.005$) and CD-RISC-10 ($p < 0.0001$). At the limits of statistical significance ($p = 0.072$), there was also a difference in the mean of the 14-MEDAS score in the five different answers.

3.6. Active–Natural Living as a Part of the Mediterranean Lifestyle

The independent sample T-test showed statistically significant higher 14-MEDAS scores in people with active–natural living as expressed by high physical activity and proximity to nature ($p < 0.05$). The same test revealed that people who had high physical activity and were close to nature had statistically significant higher MES-16 and CD-RISC-10 scores. The independent sample Kruskal–Wallis test demonstrated that people with active–natural lifestyles had statistically significant lower BMI ($p < 0.05$).

4. Discussion

Although the number of articles on mindful eating has increased significantly over the last decade, it appears that its research has been limited to the treatment of emotional eating and binge eating disorders [41]. The purpose of this study was to investigate the relationship between mindful eating and factors that contribute to mental–physical health and well-being, such as the Mediterranean lifestyle, psychological resilience, and weight management.

One of the hypotheses of this study was that mindful eating, the Mediterranean lifestyle, and psychological resilience are all inspired by Aristotelian eudaemonic values. This hypothesis appeared to be supported by the results of the study, which underline the link between happiness with mindful eating and psychological resilience, as expressed by the existence of meaning in life. The absence of a link between mindful eating and the Mediterranean diet with hedonistic well-being, as expressed by joy, validated the authors’

choice of dividing well-being into hedonistic (joy) and eudaemonic (meaning). On the other hand, and in line with previous research [42], there was a strong link between psychological resilience and both hedonistic and eudaemonic well-being.

In terms of the sample's demographics, employment status was linked to adherence to the Mediterranean diet and psychological resilience. Working in the private sector appeared to have a negative impact on Mediterranean diet adherence. Other studies have already suggested that long working hours and working remotely have a negative impact on following a prudent diet [43–45], something that seems to apply on the Mediterranean diet adherence as well. This study also indicated a difference in psychological resilience levels between the unemployed and the self-employed. Lower levels of psychological resilience in the unemployed and higher levels in the self-employed could indicate the importance of "ergon"—work for a purpose, according to Aristotle—in withstanding life adversities [46].

The findings of this research supported the hypothesis that mindful eating and adherence to the Mediterranean lifestyle are associated with psychological resilience and maintaining a healthy weight. There was a link between psychological resilience and both mindful eating and Mediterranean lifestyle adherence. Furthermore, the combination of mindful eating and the Mediterranean lifestyle appeared to work in addition to the psychological resilience prognosis. Low psychological resilience was associated with poor adherence to the Mediterranean diet and lifestyle. The possible mechanism behind these associations could be the interaction between psychology and nutrition via the gut–brain axis. The gut–brain axis denotes the bidirectional communication between the gastrointestinal tract and the brain, influencing physical and mental health. Its significance lies in regulating immunity, mood, and cognitive function [47].

The implications of this research extend beyond academia, offering practical applications in real-life settings. Understanding the association between psychological resilience, mindful eating, and adherence to the Mediterranean lifestyle holds promise in promoting overall well-being. The observed synergy between mindful eating practices and the Mediterranean lifestyle showcases their combined effect, indicating a potentially enhanced prognosis for psychological resilience. Psychological resilience fortifies individuals against adversity, fostering adaptive coping, mental well-being, and recovery from stressors. Vital in daily life, it bolsters mental health, enabling effective problem-solving and emotional regulation amidst life's challenges [48]. Notably, the revealed link between low psychological resilience and poor adherence to the Mediterranean diet and lifestyle underlines the importance of mental fortitude in sustaining healthy lifestyle choices. These insights could profoundly impact interventions aimed at fostering both mental resilience and the adoption of healthful dietary and lifestyle habits in diverse populations.

The results of mindful eating's sub-scales, particularly the "routine" sub-scale, were intriguing. The negative correlation of "routine" with the Mediterranean diet, non-correlation with psychological resilience, and positive correlation with BMI contrasts with the results of almost all other MES-16 sub-scales. For instance, a question on this sub-scale was, "I have a routine when I eat". So, it appears that the lack of routine in when and what we eat is negatively related to the Mediterranean diet and a normal BMI. The available research on the relationship between dietary routine and body weight is relatively scarce, particularly in Greece. On the other hand, having a routine for eating is typical in the Mediterranean lifestyle, as individuals prefer to dine with their families or in groups; hence, a timetable is required [49]. Studies also link eating inconsistency with obesity, as those with a normal BMI score tend to be more consistent with their meals [50]. It would be interesting to investigate this relationship further. It is worth noting that the "routine" sub-scale of the MES-16 is the only one that is not conceptually related to mindfulness [24].

In contrast to the "routine" sub-scale, the overall score of mindful eating and adherence to the Mediterranean diet was negatively correlated with BMI. The high MES-16 and 14-MEDAS scores in healthy-weight individuals supported this negative correlation. Similar findings have been reported by other researchers [51–56]. It is worth noting that

mindful eating had a stronger negative correlation with BMI than the Mediterranean diet, underlining the importance of how we eat as well as the diet we follow. Mediterranean lifestyle factors like active–natural living were associated with higher mindful eating, psychological resilience, and lower BMI, emphasizing the significance of lifestyle. Additionally, an active–natural lifestyle was directly associated with 14-MEDAS, confirming previous research [32] on the association of physical activity and proximity to nature with the Mediterranean lifestyle.

The relationship between mindful eating and following a weight loss diet and long-term weight maintenance was also studied. People who did not have to diet and those who maintained the weight they lost after a weight loss diet had a higher MES-16 score than those who regained the same or greater body weight or failed to lose weight after dieting. The average BMI of each category also contributes to the validity of the results. Both groups with a high MES-16 score had normal BMIs, whereas the two groups with a low mindful eating score had BMIs bordering on obesity. Furthermore, the mindful eating score appeared to be a predictor of weight loss maintenance after dieting.

These results hold significance as they represent the first instance in the literature where mindful eating has been associated with the sustained maintenance of weight loss over the long term, addressing the persistent issue of the yo-yo dieting phenomenon. This phenomenon has not been adequately tackled and is a contributing factor to the widespread prevalence of obesity. This phenomenon was attributed to hormonal factors by Sumithran et al. [57]. According to Contreras et al. [58], current treatment for weight variation is inadequate and is limited to either bariatric surgery or an attempt to modify the epigenetic mechanisms associated with obesity. This study could serve as the foundation for designing randomized controlled trials to investigate the relationship between mindful eating and weight variation, with the goal of developing future intervention programs to address the yo-yo dieting phenomenon and, as a result, obesity.

Limitations

The study's cross-sectional design makes it impossible to determine the direction of the causal correlation. It is not impossible that psychological resilience influences mindful eating and the Mediterranean diet. Nonetheless, previous research has shown that mindfulness interventions can increase psychological resilience [11,12], and studies have also linked the Mediterranean diet and lifestyle adherence to psychological resilience [9,59]. The findings of these studies support the current study hypothesis' causal direction.

Utilizing an online questionnaire for data collection presents constraints associated with non-probability sampling. To counter these challenges, this survey employed several strategies, including open-ended questions (e.g., for height and weight), timing checks (excluding surveys < 4 min), and consistency checks (employing follow-up questions). Non-probability sampling often restricts generalizability to the broader population. To address this, purposive and quota sampling methods were applied, using criteria for inclusion and exclusion that were carefully defined. Participants meeting specific prerequisites were included in the study, while those not meeting these predetermined conditions were excluded. This technique has been proposed in order to homogenize the sample and alleviate non-probability sampling limitations [60].

The demographic profiles of the initial 430 participants and the final 288 closely resembled those of both the general population and the specific workforce in Greece. These results offer valuable insights into the demographic structure of the workforce in Greece. Applying these findings to similar populations or sectors can aid in understanding their composition, potentially guiding targeted interventions or policy adjustments tailored to these specific groups. For instance, insights gained from this study could inform workforce planning, resource allocation, or health initiatives aimed at improving well-being within similar workforce demographics in other regions or industries.

Finally, limitations of this study include social desirability, the tendency of individuals to respond to questions or behave in a manner they perceive as socially acceptable or favor-

able rather than expressing their true thoughts, feelings, or behaviors [61], and recall bias, the tendency of individuals to inaccurately remember or report past events, experiences, or behaviors [62].

The Mediterranean lifestyle is a relatively new scientific structure with no commonly acknowledged description and assessment [63]. This constraint could be addressed by the establishment of a new scale that encompasses all aspects of the traditional Mediterranean lifestyle, such as nutrition, physical activity, socializing, nature-relatedness, and sustainability.

5. Conclusions

To our knowledge, this study represents the inaugural attempt to explore the synergic association of mindful eating and the Mediterranean lifestyle with resilience and wellness. The results of this study suggest that meaning in life appears to be the connecting link between mindful eating, the Mediterranean lifestyle, and psychological resilience. Employment status is related to Mediterranean diet adherence and psychological resilience, while a meal routine is associated with the Mediterranean diet and a normal BMI. In conclusion, mindful eating and adherence to the Mediterranean lifestyle may have a positive effect on psychological resilience and could be the key to achieving and maintaining weight loss on a weight-reduction diet. To confirm the findings of this cross-sectional study, randomized controlled trials should be conducted.

Author Contributions: Conceptualization, E.C. and A.E.K.; Data curation, E.C.; Formal analysis, E.C.; Investigation, E.C., G.-E.D., C.K. and C.G.; Methodology, E.C., G.-E.D., C.K. and C.G.; Project administration, A.E.K.; Resources, E.C., G.-E.D., C.K., C.G. and A.E.K.; Software, E.C.; Supervision, A.E.K.; Validation, E.C.; Visualization, A.E.K.; Writing—original draft, E.C.; Writing—review and editing, A.E.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the ethics and deontology committee of the University of the Aegean (protocol no. 17715/9 September 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent has been obtained from the patient(s) to publish this paper.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: The authors thank all the participants of the study.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Kumar, S.; Preetha, G. Health promotion: An effective tool for global health. *Indian. J. Community Med.* **2012**, *37*, 5–12. [[CrossRef](#)] [[PubMed](#)]
2. Søvold, L.E.; Naslund, J.A.; Kousoulis, A.A.; Saxena, S.; Qoronfleh, M.W.; Grobler, C.; Münter, L. Prioritizing the Mental Health and Well-Being of Healthcare Workers: An Urgent Global Public Health Priority. *Front. Public Health* **2021**, *9*, 679397. [[CrossRef](#)] [[PubMed](#)]
3. Colbourn, T. COVID-19: Extending or relaxing distancing control measures. *Lancet Public Health* **2020**, *5*, e236–e237. [[CrossRef](#)] [[PubMed](#)]
4. Chowdhury, M.A.; Shuvho, B.A.; Shahid, A.; Haque, A.M.; Kashem, M.A.; Lam, S.S.; Ong, H.C.; Uddin, A.; Mofijur, M. Prospect of biobased antiviral face mask to limit the coronavirus outbreak. *Environ. Res.* **2021**, *192*, 110294. [[CrossRef](#)] [[PubMed](#)]
5. Mofijur, M.; Fattah, I.R.; Alam, M.A.; Islam, A.S.; Ong, H.C.; Rahman, S.A.; Najafi, G.; Ahmed, S.; Uddin, M.A.; Mahlia, T. Impact of COVID-19 on the social, economic, environmental and energy domains: Lessons learnt from a global pandemic. *Sustain. Prod. Consum.* **2021**, *26*, 343–359. [[CrossRef](#)]
6. Zhang, H. Challenges and Approaches of the Global Governance of Public Health Under COVID-19. *Front. Public Health* **2021**, *9*, 727214. [[CrossRef](#)]
7. Dong, F.; Liu, H.L.; Dai, N.; Yang, M.; Liu, J.P. A living systematic review of the psychological problems in people suffering from COVID-19. *J. Affect. Disord.* **2021**, *292*, 172–188. [[CrossRef](#)]

8. Christodoulou, E.; Meca, A.; Koutelidakis, A.E. Herbal Infusions as a Part of the Mediterranean Diet and Their Association with Psychological Resilience: The Paradigm of Greek Mountain Tea. *Nutraceuticals* **2023**, *3*, 438–450. [CrossRef]
9. Muscaritoli, M. The Impact of Nutrients on Mental Health and Well-Being: Insights From the Literature. *Front. Nutr.* **2021**, *8*, 656290. [CrossRef]
10. Martini, D. Health Benefits of Mediterranean Diet. *Nutrients* **2019**, *11*, 1802. [CrossRef]
11. Mantzios, M. Mindful eating: A conceptual critical review of the literature, measurement and intervention development. *Nutr. Health* **2023**, *29*, 435–441. [CrossRef] [PubMed]
12. Finicelli, M.; Di Salle, A.; Galderisi, U.; Peluso, G. The Mediterranean Diet: An Update of the Clinical Trials. *Nutrients* **2022**, *14*, 2956. [CrossRef] [PubMed]
13. Mantzios, M. (Re)defining mindful eating into mindful eating behaviour to advance scientific enquiry. *Nutr. Health* **2021**, *27*, 367–371. [CrossRef] [PubMed]
14. Rackham, H. *Aristotle the Nichomachean Ethics with an English Translation by H. Rackham*; Harvard University Press: Boston, MA, USA, 1926.
15. McEvilley, T. *The Shape of Ancient Thought*; Allworth Press: New York, NY, USA, 2002; p. 609.
16. Weiss, N. Philosophical Mindfulness an essay about the art of philosophizing. *Rev. Int. De Filos. Apl.* **2017**, *8*, 91–123.
17. Mantzios, M.; Wilson, J.C. Mindfulness, Eating Behaviours, and Obesity: A Review and Reflection on Current Findings. *Curr. Obes. Rep.* **2015**, *4*, 141–146. [CrossRef] [PubMed]
18. Garg, R. Methodology for research I. *Indian. J. Anaesth.* **2016**, *60*, 640–645. [CrossRef]
19. Regmi, P.R.; Waithaka, E.; Paudyal, A.; Simkhada, P.; van Teijlingen, E. Guide to the design and application of online questionnaire surveys. *Nepal. J. Epidemiol.* **2016**, *6*, 640–644. [CrossRef] [PubMed]
20. Rees, C.S.; Breen, L.J.; Cusack, L.; Hegney, D. Understanding individual resilience in the workplace: The international collaboration of workforce resilience model. *Front. Psychol.* **2015**, *6*, 73. [CrossRef]
21. Charan, J.; Biswas, T. How to calculate sample size for different study designs in medical research? *Indian. J. Psychol. Med.* **2013**, *35*, 121–126. [CrossRef]
22. Gelinias, L.; Pierce, R.; Winkler, S.; Cohen, I.G.; Lynch, H.F.; Bierer, B.E. Using Social Media as a Research Recruitment Tool: Ethical Issues and Recommendations. *Am. J. Bioeth.* **2017**, *17*, 3–14. [CrossRef]
23. In, J. Introduction of a pilot study. *Korean J. Anesthesiol.* **2017**, *70*, 601–605. [CrossRef]
24. Hulbert-Williams, L.; Nicholls, W.; Joy, J.; Hulbert-Williams, N. Initial validation of the Mindful Eating Scale. *Mindfulness* **2014**, *5*, 719–729. [CrossRef]
25. Mantzios, M. Development and initial validation of the Trait and State Mindful Eating Behaviour scales. *Res. Sq.* **2022**, preprint. [CrossRef] [PubMed]
26. Hulbert-Williams, L.; Nichols, W.; Flynn, S.; Hulbert-Williams, N. Further Development and Validation of a Novel Measure of Trait Mindful Eating (Poster). Retrieved from University of Chester Website. Available online: <https://www.chester.ac.uk/sites/files/chester/Mindful%20eating%20scale%20CFA%20poster.pdf> (accessed on 22 January 2023).
27. Arnold, W.E.; McCroskey, J.C.; Prichard, S.V.O. The Likert-type scale. *Today's Speech* **1967**, *15*, 31–33. [CrossRef]
28. Schröder, H.; Fitó, M.; Estruch, R.; Martínez-González, M.A.; Corella, D.; Salas-Salvadó, J.; Lamuela-Raventós, R.; Ros, E.; Salaverriá, I.; Fiol, M.; et al. A short screener is valid for assessing Mediterranean diet adherence among older Spanish men and women. *J. Nutr.* **2011**, *141*, 1140–1145. [CrossRef]
29. García-Conesa, M.-T.; Philippou, E.; Pafilas, C.; Massaro, M.; Quarta, S.; Andrade, V.; Jorge, R.; Chervenkov, M.; Ivanova, T.; Dimitrova, D.; et al. Exploring the Validity of the 14-Item Mediterranean Diet Adherence Screener (MEDAS): A Cross-National Study in Seven European Countries around the Mediterranean Region. *Nutrients* **2020**, *12*, 2960. [CrossRef] [PubMed]
30. Connor, K.M.; Davidson, J.R. Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depress. Anxiety* **2003**, *18*, 76–82. [CrossRef]
31. Tsigkaropoulou, E.; Douzenis, A.; Tsitas, N.; Ferentinos, P.; Liappas, I.; Michopoulos, I. Greek Version of the Connor-Davidson Resilience Scale: Psychometric Properties in a Sample of 546 Subjects. *In Vivo* **2018**, *32*, 1629–1634. [CrossRef]
32. Christodoulou, E.; Deligiannidou, G.-E.; Kontogiorgis, C.; Giaginis, C.; Koutelidakis, A.E. Natural Functional Foods as a Part of the Mediterranean Lifestyle and Their Association with Psychological Resilience and Other Health-Related Parameters. *Appl. Sci.* **2023**, *13*, 4076. [CrossRef]
33. Chacón-Cuberos, R.; Castro-Sánchez, M.; Pérez-Turpin, J.A.; Olmedo-Moreno, E.M.; Zurita Ortega, F. Levels of Physical Activity Are Associated With the Motivational Climate and Resilience in University Students of Physical Education From Andalucía: An Explanatory Model. *Front. Psychol.* **2019**, *10*, 1821. [CrossRef]
34. White, M.P.; Alcock, I.; Grellier, J.; Wheeler, B.W.; Hartig, T.; Warber, S.L.; Bone, A.; Depledge, M.H.; Fleming, L.E. Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Sci. Rep.* **2019**, *9*, 7730. [CrossRef]
35. Ryff, C.D.; Singer, B. The contours of positive human health. *Psychol. Inq.* **1998**, *9*, 1–28. [CrossRef]
36. Jones, T.L.; Baxter, M.A.; Khanduja, V. A quick guide to survey research. *Ann. R. Coll. Surg. Engl.* **2013**, *95*, 5–7. [CrossRef] [PubMed]
37. Hodge, J.M.; Shah, R.; McCullough, M.L.; Gapstur, S.M.; Patel, A.V. Validation of self-reported height and weight in a large, nationwide cohort of U.S. adults. *PLoS ONE* **2020**, *15*, e0231229. [CrossRef]
38. Nuttall, F.Q. Body Mass Index: Obesity, BMI, and Health: A Critical Review. *Nutr. Today* **2015**, *50*, 117–128. [CrossRef] [PubMed]

39. Kwak, S.K.; Kim, J.H. Statistical data preparation: Management of missing values and outliers. *Korean J. Anesthesiol.* **2017**, *70*, 407–411. [[CrossRef](#)] [[PubMed](#)]
40. Ghasemi, A.; Zahediasl, S. Normality tests for statistical analysis: A guide for non-statisticians. *Int. J. Endocrinol. Metab.* **2012**, *10*, 486–489. [[CrossRef](#)]
41. Warren, J.M.; Smith, N.; Ashwell, M. A structured literature review on the role of mindfulness, mindful eating and intuitive eating in changing eating behaviours: Effectiveness and associated potential mechanisms. *Nutr. Res. Rev.* **2017**, *30*, 272–283. [[CrossRef](#)]
42. Di Fabio, A.; Palazzeschi, L. Hedonic and eudaimonic well-being: The role of resilience beyond fluid intelligence and personality traits. *Front. Psychol.* **2015**, *6*, 1367. [[CrossRef](#)]
43. Escoto, K.H.; Laska, M.N.; Larson, N.; Neumark-Sztainer, D.; Hannan, P.J. Work hours and perceived time barriers to healthful eating among young adults. *Am. J. Health Behav.* **2012**, *36*, 786–796. [[CrossRef](#)]
44. Min, J.; Lee, D.W.; Kang, M.Y.; Myong, J.P.; Kim, H.R.; Lee, J. Working for Long Hours Is Associated With Dietary Fiber Insufficiency. *Front. Nutr.* **2022**, *9*, 786569. [[CrossRef](#)]
45. Project, C.; Kubo, Y.; Ishimaru, T.; Hino, A.; Nagata, M.; Ikegami, K.; Tateishi, S.; Tsuji, M.; Matsuda, S.; Fujino, Y. A cross-sectional study of the association between frequency of telecommuting and unhealthy dietary habits among Japanese workers during the COVID-19 pandemic. *J. Occup. Health* **2021**, *63*, e12281. [[CrossRef](#)]
46. Angier, T. Aristotle on work. *Rev. Int. De Philos.* **2016**, *278*, 435–449. [[CrossRef](#)]
47. Clapp, M.; Aurora, N.; Herrera, L.; Bhatia, M.; Wilen, E.; Wakefield, S. Gut microbiota's effect on mental health: The gut-brain axis. *Clin. Pract.* **2017**, *7*, 987. [[CrossRef](#)]
48. AlQarni, A.M.; Elfaki, A.; Wahab, M.M.A.; Aljehani, Y.; Alkhunaizi, A.; Othman, S.; AlShamlan, R.A. Psychological Resilience, Anxiety, and Well-Being of Health Care Providers During the COVID-19 Pandemic. *J. Multidiscip. Healthc.* **2023**, *16*, 1327–1335. [[CrossRef](#)] [[PubMed](#)]
49. de la Torre-Moral, A.; Fàbregues, S.; Bach-Faig, A.; Fornieles-Deu, A.; Medina, F.X.; Aguilar-Martínez, A.; Sánchez-Carracedo, D. Family Meals, Conviviality, and the Mediterranean Diet among Families with Adolescents. *Int. J. Environ. Res. Public Health* **2021**, *18*, 2499. [[CrossRef](#)] [[PubMed](#)]
50. Adnan, D.; Trinh, J.; Bishehsari, F. Inconsistent eating time is associated with obesity: A prospective study. *EXCLI J.* **2022**, *21*, 300–306. [[CrossRef](#)]
51. Fuentes Artilles, R.; Staub, K.; Aldakak, L.; Eppenberger, P.; Rühli, F.; Bender, N. Mindful eating and common diet programs lower body weight similarly: Systematic review and meta-analysis. *Obes. Rev.* **2019**, *20*, 1619–1627. [[CrossRef](#)]
52. Demirbas, N.; Kutlu, R.; Kurnaz, A. The Relationship between Mindful Eating and Body Mass Index and Body Compositions in Adults. *Ann. Nutr. Metab.* **2021**, *77*, 262–270. [[CrossRef](#)]
53. Buckland, G.; Bach, A.; Serra-Majem, L. Obesity and the Mediterranean diet: A systematic review of observational and intervention studies. *Obes. Rev.* **2008**, *9*, 582–593. [[CrossRef](#)]
54. Estruch, R.; Martínez-González, M.A.; Corella, D.; Salas-Salvadó, J.; Fitó, M.; Chiva-Blanch, G.; Fiol, M.; Gómez-Gracia, E.; Arós, F.; Lapetra, J.; et al. Effect of a high-fat Mediterranean diet on bodyweight and waist circumference: A prespecified secondary outcomes analysis of the PREDIMED randomised controlled trial. *Lancet Diabetes Endocrinol.* **2019**, *7*, e6–e17. [[CrossRef](#)] [[PubMed](#)]
55. Martínez-González, M.A.; García-Arellano, A.; Toledo, E.; Salas-Salvadó, J.; Buil-Cosiales, P.; Corella, D.; Covas, M.I.; Schröder, H.; Arós, F.; Gómez-Gracia, E.; et al. A 14-item Mediterranean diet assessment tool and obesity indexes among high-risk subjects: The PREDIMED trial. *PLoS ONE* **2012**, *7*, e43134. [[CrossRef](#)] [[PubMed](#)]
56. Panagiotakos, D.B.; Chrysohoou, C.; Pitsavos, C.; Stefanadis, C. Association between the prevalence of obesity and adherence to the Mediterranean diet: The ATTICA study. *Nutrition* **2006**, *22*, 449–456. [[CrossRef](#)]
57. Sumithran, P.; Prendergast, L.A.; Delbridge, E.; Purcell, K.; Shulkes, A.; Kriketos, A.; Proietto, J. Long-term persistence of hormonal adaptations to weight loss. *N. Engl. J. Med.* **2011**, *365*, 1597–1604. [[CrossRef](#)] [[PubMed](#)]
58. Contreras, R.E.; Schriever, S.C.; Pfluger, P.T. Physiological and Epigenetic Features of Yoyo Dieting and Weight Control. *Front. Genet.* **2019**, *10*, 1015. [[CrossRef](#)]
59. Sotos-Prieto, M.; Ortolá, R.; López-García, E.; Rodríguez-Artalejo, F.; García-Esquinas, E. Adherence to the Mediterranean Diet and Physical Resilience in Older Adults: The Seniors-ENRICA Cohort. *J. Gerontol. A Biol. Sci. Med. Sci.* **2021**, *76*, 505–512. [[CrossRef](#)]
60. Jager, J.; Putnick, D.L.; Bornstein, M.H., II. More than just convenient: The scientific merits of homogeneous convenience samples. *Monogr. Soc. Res. Child. Dev.* **2017**, *82*, 13–30. [[CrossRef](#)] [[PubMed](#)]
61. Bispo Júnior, J.P. Social desirability bias in qualitative health research. *Rev. Saude Publica* **2022**, *56*, 101. [[CrossRef](#)]
62. Althubaiti, A. Information bias in health research: Definition, pitfalls, and adjustment methods. *J. Multidiscip. Healthc.* **2016**, *9*, 211–217. [[CrossRef](#)]
63. Montero-Sandiego, E.; Ferrer-Cascales, R.; Ruiz-Robledillo, N.; Costa-López, B.; Alcocer-Bruno, C.; Albaladejo-Blázquez, N. Assessment Strategies to Evaluate the Mediterranean Lifestyle: A Systematic Review. *Nutrients* **2022**, *14*, 4179. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.